


VPDES PERMIT FACT SHEET

This document gives the pertinent information concerning the **reissuance** of the VPDES permit listed below. This permit is being processed as a **minor municipal** permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et seq.

The discharge results from the operation of a **0.20 MGD oxidation ditch treatment plant** serving the Town of Pembroke. This permit action consists of decreasing the monitoring frequencies for BOD₅ and total suspended solids, revising the *E. coli* monitoring, revising the total residual chlorine limits (when applicable), and revising the special conditions. (SIC Code: 4952)

1. **Facility Name and Address:**
Pembroke WWTP
PO Box 5
Pembroke, VA 24136
Location: 126 Park Lane, Pembroke
2. **Permit No:** **VA0088048** Existing Permit Expiration Date: November 15, 2013
3. **Facility/ Owner Contacts:**
Mr. Stanley Lucas, Public Works Director, 540-626-7607; utilitydir@pemtel.net
Mr. Donald Poteet, Mayor, 540-626-7191
4. **Application Complete Date:** May 15, 2013
Permit Drafted By: Becky L. France, Water Permit Writer
Date: July 9, 2013, Revised 8/13/13
DEQ Regional Office: Blue Ridge Regional Office
Reviewed By: Kip D. Foster, Water Permit Manager
Reviewer's Signature:  Date: 8/19/2013
Public Comment Period Dates: From 8/1/13 To 8/30/13
5. **Receiving Stream Classification:**
Receiving Stream: New River (River Mile: 50.82)
Watershed ID: VAW-N29R (New River Watershed)
River Basin: New River
River Subbasin: NA
Section: I
Class: IV
Special Standards: u
7-Day, 10-Year Low Flow: 486 MGD 7-Day, 10-Year High Flow: 836 MGD
1-Day, 10-Year Low Flow: 407 MGD 1-Day, 10-Year High Flow: 600 MGD
30-Day, 5-Year Low Flow: 708 MGD Harmonic Mean Flow: 1605 MGD
Tidal: No 303(d) Listed: Yes - PCBs

Attachment A contains a copy of the flow frequency determination memorandum.

6. **Operator License Requirements:** III7. **Reliability Class:** II8. **Permit Characterization:**

- ☐ Private ☐ Interim Limits in Other Document
☐ Federal ☐ Possible Interstate Effect
☐ State
☒ POTW
☐ PVOTW

9. **Wastewater Treatment System:** A description of the wastewater treatment system is provided below. See **Attachment B** for the wastewater treatment schematic and **Attachment C** for a copy of the site inspection report. Treatment units associated with the discharge are listed in the table below.

Table I
DISCHARGE DESCRIPTION

| Outfall Number | Discharge Source | Treatment (Unit by Unit) | Flow (Design) (MGD) |
|----------------|------------------|--|---------------------|
| 001 | Pembroke WWTP | bar screen comminutor grit chamber oxidation ditches (2) secondary clarifiers (2) UV disinfection banks (2) cascade aerator aerobic digesters sludge drying beds (4) | 0.20 |

The Town of Pembroke operates a 0.20 MGD oxidation ditch system for the residents of the Pembroke area. The wastewater works consists of a bar screen, comminutor, grit chamber, oxidation ditches, clarifiers, UV light banks, cascade aerator, aerobic digesters, and sand drying beds. This facility began operation in 1996.

After flowing through a bar screen, comminutor, and grit chamber, the wastewater is routed through one of two aerated oxidation ditches. Then wastewater flows into two clarifiers. Solids that accumulate in a sludge hopper and the scum from the trough are wasted daily. The wastewater overflows the weirs and is disinfected by one of two banks of ultraviolet lights. Disinfected effluent flows through a cascade aerator and is discharged to the New River.

10. **Sewage Sludge Use or Disposal:** A VPDES Sewage Sludge Permit Application Form was submitted for this facility to address disposal of sewage sludge from the wastewater treatment facility. Sludge is aerobically digested and then dewatered in drying beds. Dewatered sludge is periodically hauled to the New River Resource Authority in Dublin, Virginia.
11. **Discharge Location Description:** A USGS topographic map which indicates the discharge location, any significant dischargers, any water intakes, and other items of interest is included in **Attachment D**. The latitude and longitude of the discharge are N 37°18'51.98", E 80°38'34.00".
- Name of Topo: Pearisburg Number: 112C
12. **Material Storage:** NA
13. **Ambient Water Quality Information:** Memoranda or other information which helped to develop permit conditions (special water quality studies, STORET data, and any other biological and/or chemical data, etc.) are listed below.

Receiving Stream Classification

Pembroke WWTP discharges into the New River Watershed (VAW-N24R). The Virginia Department of Health has issued a health advisory for a segment of the New River from the Route 114 bridge crossing just north of Radford downstream to the Virginia/West Virginia state line near Glen Lyn. This stream segment is impaired due to PCBs found in fish tissue.

Flow Frequency Data

Flow frequencies for outfall 001 were recalculated using flow frequencies for the gauges at Eggleston and Glen Lyn. The Eggleston gauge is located at the Route 730 bridge in Eggleston, Virginia 4 miles upstream of the discharge point. The nearest downstream continuous record gauge on the New River is located at Glen Lyn, Virginia. There are several discharges and withdrawals between the discharge point and the Glen Lyn gauge.

Since there is no current flow information for the Eggleston gauge, flow frequencies for the gauge were determined by calculating a ratio of Glen Lyn and Eggleston gauge data from the same period of record (1940 - 1976) and multiplying the ratio by the current flow frequencies at Glen Lyn. To solve for the flow frequencies at the discharge point, a ratio of the drainage area of the Eggleston gauge and the discharge point were used to calculate the flow at the discharge point. **Attachment A** contains a copy of the flow frequency determination memorandum.

Stream Water Quality Data

The nearest downstream STORET monitoring station (9-NEW030.15) is located at the Route 460 bridge in Glen Lyn, Virginia. This station is just below APCO's intake and the APCO-Glen Lyn discharge for outfalls 001, 002, and 003. The 90th percentile pH and average hardness used in the wasteload allocation spreadsheets were determined from STORET Station 9-NEW030.15 in Glen Lyn. Since the discharges from the APCO facility include noncontact cooling water, the temperature values at this station were not used to determine the 90th percentile temperature value. Metals and PCB data have also been collected for this monitoring station.

The nearest upstream STORET monitoring station (9-NEW056.22) is located at the Route 760 bridge in Eggleston, Virginia. This station is located above the Celanese Acetate plant in Narrows and cannot be used for background metals data. Since there are no non-contact cooling water discharges upstream of this station, the 90th percentile temperature used in the wasteload allocation was determined from this station. The monitoring data for these stations are included in **Attachment E**.

Endangered Species Evaluation

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has identified natural heritage resources in the project area. The Candy Darter and Hellbender have been historically documented in the New River.

14. **Antidegradation Review and Comments:** Tier 1 ☐ Tier 2 ☒ Tier 3 ☐

The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The antidegradation review begins with Tier determination. The New River is not listed as a public water supply in the segment where the discharge is located. The New River in this segment (VAW-N29R) is listed on Part I of the 303(d) list for PCBs in fish tissue. However, according to Agency guidance, fish tissue analysis and metals in sediments are not a basis for determining a receiving stream as Tier 1. Available pollutant data have been analyzed, and the existing water quality condition for pollutants for which data exist compared to the water quality standards. This analysis indicates the water quality of the receiving stream does not exceed numeric criteria for any pollutant analyzed. Therefore, this segment of the New River is classified as a Tier 2 water, and no significant degradation of existing quality is allowed.

For purposes of aquatic life protection in Tier 2 waters, "significant degradation" means that no more than 25 percent of the difference between the acute and chronic aquatic criteria values and the existing quality (unused assimilative capacity) may be allocated. For purposes of human health protection, "significant degradation" means that no more than 10 percent of the difference between the human health criteria and the existing quality (unused assimilative capacity) may be allocated. The antidegradation baselines for aquatic life and human health are calculated for each pollutant as follows:

Antidegradation baseline (aquatic life) = 0.25 (WQS – existing quality) + existing quality

Antidegradation baseline (human health) = 0.10 (WQS – existing quality) + existing quality

Where:

“WQS” = Numeric criterion listed in 9 VAC 25-260-00 et seq. for the parameter analyzed

“Existing quality” = Concentration of the parameter being analyzed in the receiving stream

When applied, these “antidegradation baselines” become the new water quality criteria in Tier 2 waters, and effluent limits must be written to maintain the antidegradation baselines for each pollutant. Antidegradation baselines have been calculated as described above and included in **Attachment G**.

Since this discharge began in 1996 when construction of the Pembroke WWTP was completed, antidegradation guidelines are applicable and have been applied to this permit reissuance. Water quality based effluent limits for pH and total residual chlorine (TRC) have been established in compliance with antidegradation requirements set forth in 9 VAC 25-260-30 of the water quality standards regulations. In accordance with antidegradation policy, pH will be maintained within the range of 6.0 S.U. and 9.0 S.U. For BOD₅, antidegradation has been applied to prevent a significant lowering of dissolved oxygen (DO) more than 0.20 mg/L from the existing level (90 percent DO saturation value) in the receiving stream. The antidegradation review was conducted as described in Guidance Memo 00-2011, and complies with the antidegradation policy contained in Virginia's Water Quality Standards. The permit limits are in compliance with antidegradation requirements set forth in 9 VAC 25-260-30.

15. **Site Inspection:** Date: 4/16/13 Performed by: Becky L. France
Attachment C contains a copy of the site inspection memorandum. The last DEQ laboratory and technical inspection was conducted by Ryan L. Hendrix on April 10, 2013.
16. **Effluent Screening and Limitation Development:** DEQ Guidance Memo 00-2011 was used in developing all water quality based limits pursuant to water quality standards (9 VAC 25-260-5 et seq.). The 90th percentile stream temperatures were calculated from an upstream STORET monitoring station in Eggleston. The 90th percentile pH and average hardness values were calculated from a downstream STORET monitoring station in Glen Lyn. The effluent 90th temperature percentiles calculated from effluent data collected from July 2007 through June 2008 were carried forward from a previous permit cycle. The effluent 90th pH percentiles were calculated from effluent data collected during the permit term from January 2008 through August 2012. The effluent hardness data collected on April 4, 2007 during the previous permit term was used in the wasteload allocation spreadsheet calculations. Refer to **Attachment E** for stream data and **Attachment F** effluent data used in these calculations. Refer to **Attachment G** for the antidegradation wasteload allocation spreadsheet and effluent limit calculations. See **Table II** on page 16 for a summary of limitations and monitoring requirements and **Table III** on page 17 for a summary of changes to the limitations and monitoring requirements.

A. **Mixing Zone**

The Agency mixing zone program, MIXER, was run to determine the percentage of the receiving stream flow that can be used in the antidegradation wasteload allocation calculations. The program indicated that 0.66 percent of the 1Q10 and 37.43 percent of

the 7Q10 may be used for calculating the acute and chronic antidegradation wasteload allocations (AWLAs). A copy of the printout from the MIXER run is included in **Attachment G**.

B. Effluent Limitations for Conventional Pollutants

Flow -- The permitted design flow of 0.20 MGD for this facility is taken from the previous permit and the application for the reissuance. In accordance with the VPDES Permit Manual, flow is to be measured on a continuous basis with totalizing, indicating, and recording equipment.

pH -- Between May 2010 and April 2013 there were no exceedances of the pH limitations. The pH limits of 6.0 S.U. minimum and 9.0 S.U. maximum have been continued from the previous permit. These limits are based upon the water quality criteria in 9 VAC 25-260-50 for Class IV receiving waters and are in accordance with federal technology-based guidelines, 40 CFR Part 133, for secondary treatment. Grab samples shall continue to be collected once per day.

Total Suspended Solids (TSS) -- Between May 2010 and April 2013, there were no exceedances of the TSS limitations (**Attachment H**). TSS limits are technology-based requirements for municipal dischargers with secondary treatment required in accordance with 40 CFR Part 133. TSS is a technology-based requirement for municipal dischargers with secondary treatment required in accordance with 40 CFR Part 133. These effluent limits of 30 mg/L (22 kg/d) monthly average and 45 mg/L (34 kg/d) weekly average have been continued from the previous permit.

Eight hour composite samples shall continue to be collected. The TSS data from the last three years during the permit term were evaluated to determine if the facility qualifies for a reduced monitoring frequency. In accordance with Guidance Memo 98-2005, the facility qualifies for a reduced monitoring frequency of 1/week. See **Attachment H** for a summary of the discharge data and a discussion of the criteria for reduced monitoring.

Biochemical Oxygen Demand (BOD₅) -- Between May 2010 and April 2013, there were no exceedances of the BOD₅ limitations (**Attachment H**). Since there have been a decrease in the flow frequencies at the outfall, the new data have been entered into the Regional Water Quality Model for Free Flowing Streams (Version 4.0) to update calculations for BOD₅ limits. A copy of the model output results is found in **Attachment I**. An initial DO concentration of 0 mg/L, a TKN value of 20 mg/L, and 30 mg/L for BOD₅ were used in the model input. The background dissolved oxygen was 7.154 mg/L. The model predicted a dissolved oxygen (DO) sag at the initial discharge point to 7.151 mg/L. This sag is 0.003 mg/L below the existing background condition of 7.154 mg/L. So, these effluent concentrations do not violate the antidegradation policy. Therefore, current treatment limits for BOD₅ are protective of the water quality, and a limit for DO is not needed to meet the DO water quality criterion in 9 VAC 25-260-50 for Class IV receiving waters.

BOD₅ limits are technology-based requirements for municipal dischargers with secondary treatment required in accordance with 40 CFR Part 133. These effluent limits of 30 mg/L (22 kg/d) monthly average and 45 mg/L (34 kg/d) have been continued from the previous permit. In accordance with the VPDES Permit Manual recommendations, BOD₅ shall continue to be monitored via eight-hour composite samples.

The State Water Control Board 1976 Comprehensive Water Resources Plan, Planning Bulletin 205A states that the major point sources of BOD₅ loading, which include a proposed treatment plant for the Town of Pembroke, are not projected to violate the BOD assimilation capacity in the New River through 2020. **Attachment E** contains an excerpt from this planning bulletin.

The BOD₅ data from the last three years during the permit term were evaluated to determine if the facility qualifies for a reduced monitoring frequency. In accordance with Guidance Memo 98-2005, the facility qualifies for a reduced monitoring frequency of 1/week. See **Attachment H** for a summary of the discharge data and a discussion of the criteria for reduced monitoring.

E. coli -- Between January 2008 and February 2013, there were no exceedances of the *E. coli* limitation. There were revised Water Quality Standards became effective on February 1, 2010, and included updates to the bacteria and disinfection policy in 9 VAC 25-260-170. The Water Quality Standards, 9 VAC 25-260-170, have been revised to indicate that the geometric mean "shall be calculated using all data collected during any calendar month with a minimum of four weekly samples." The limit of 126 cfu/100 mL monthly average has been continued from the previous permit. Grab samples shall be collected 3 days/week between 10 AM and 4 PM.

C. **Effluent Limitation Evaluation for Toxic Pollutants**

In addition to the standard limitations, the discharge must be evaluated to determine whether there is a reasonable potential for the effluent to violate the water quality standards (WQSs) adopted by the State Water Control Board (9 VAC 25-260 et. seq). A summary of the effluent pesticides, semivolatiles, volatiles, and metal data are summarized in **Attachment F**. With the exception of hydrogen sulfide, total copper, and total zinc, none of the pollutant data submitted was above the quantification levels. For each of these parameters, the acute and chronic antidegradation wasteload allocations and effluent data have been input into the STATS program. The program output indicates that permit limits are not needed for hydrogen sulfide, total copper, or total zinc. A copy of the STATS program results is included in **Attachment G**.

Ammonia – Since there have been a decrease in the flow frequencies at the outfall and changes in the temperature and pH, the need for an ammonia limit has been reassessed. The acute and chronic AWLAs and the effluent data were used as input in the Agency's STATS program to determine if limits were necessary for ammonia. For ammonia, a default value of 9.0 mg/L was used as the program input in accordance with Agency

guidance. The program output indicates that permit limits are not necessary for ammonia. A copy of the STATS program result for ammonia is included in **Attachment G**.

Total Residual Chlorine (TRC) – The facility uses ultraviolet light as the disinfection method. In the event that the permittee decides to use TRC as an alternative method of disinfection methods, TRC limits have been established to avoid any future modifications to the permit. These limits are included in Part I.B of the permit. In the absence of TRC data, one data value, equal to the QL, was assumed to exist. This methodology is similar to that discussed in Guidance Memo 00-2011 for ammonia. Antidegradation wasteload allocations (AWLAs) have been established for TRC to protect the receiving stream from degradation. Since no data exist for the Tier 2 receiving stream, the baseline is equal to 25 percent of the criterion.

The TRC limits in the previous permit were reassessed with the AWLAs that were determined from revised temperature, pH, and stream flow frequencies. Based on the acute and chronic AWLAs and the Agency's STATS program, permit limits of 0.12 mg/L monthly average and 0.14 mg/L weekly average are needed in the permit. These more stringent limits replace the previous permit limits. In accordance with the VPDES Permit Manual, effluent TRC shall be monitored 3/day at 4 hour intervals via grab samples.

PCBs – PCB congener effluent testing was completed by the permittee on August 20, 2002. The data were below the quantification level of 1.0 µg/L. However, DEQ has developed a water quality criterion of 0.0017 µg/L (9VAC25-260-140) which is significantly below this quantification level. EPA Testing Method 1668A is capable of achieving a quantifications level below this water quality criteria. In addition, the Virginia Department of Health has established a fish consumption advisory for carp and catfish in the New River. So, this segment of the New River does not achieve the fishable designated use defined in 9 VAC 25-260-10 of the Water Quality Standards. Guidance Memo 09-2001 provides the PCB monitoring protocol for TMDL development. PCB monitoring for outfall 001 is included in a permit special condition (Part I.C.14). In accordance with Guidance Memo 09-2001, one wet weather sample and one dry weather sample shall be required. See **Attachment E** of the PCB impaired waters fact sheet.

17. **Basis for Sludge Use and Disposal Requirements:** Since the facility hauls dewatered sludge to a landfill, there are no sludge limits or monitoring requirements.
18. **Antibacksliding Statement:** Since there are no limitations less stringent than the previous permit, the permit limits comply with the antibacksliding requirements of 9 VAC 25-31-220 L of the VPDES Permit Regulation.
19. **Compliance Schedules:** There are no compliance schedules included in this permit.

20. **Special Conditions:** A brief rationale for each special condition contained in the permit is given below.

A. **Total Residual Chlorine (TRC) Limitations and Monitoring Requirements (Part I.B)**

Rationale: Should the permittee elect to disinfect by chlorine rather than UV light, this condition establishes TRC concentration limits after chlorine contact and final TRC effluent limits and monitoring requirements. This condition is in accordance with chlorine criteria in 9 VAC 25-790 of the Sewage Collection and Treatment Regulations. Also, 40 CFR 122.41(e) requires the permittee, at all times, to properly operate and maintain all facilities and systems of treatment in order to comply with the permit. These requirements ensure proper operation of chlorination equipment to maintain adequate disinfection.

B. **Compliance Reporting (Part I.C.1)**

Rationale: In accordance with VPDES Permit Regulation, 9 VAC 25-31-190 J4 and 220 I, DEQ is authorized to establish monitoring methods and procedures to compile and analyze data. This condition is necessary when pollutants are monitored by the permittee and a maximum level of quantification and/or specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. This condition also establishes protocols for calculation of reported values.

C. **95% Capacity Reopener (Part I.C.2)**

Rationale: This condition requires that the permittee address problems resulting from high influent flows, in a timely fashion, to avoid non-compliance and water quality problems from plant overloading. This requirement is contained in 9 VAC 25-31-200 B4 for all POTW and PVOTW permits.

D. **Indirect Dischargers (Part I.C.3)**

Rationale: This condition is required by VPDES Permit Regulation, 9 VAC 25-31-200 B1 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

E. **CTC, CTO Requirement (Part I.C.4)**

Rationale: This condition is required by Code of Virginia § 62.1-44.19 and the Sewage Collection and Treatment Regulations, 9 VAC 25-790.

F. Operations and Maintenance Manual Requirement (Part I.C.5)

Rationale: An Operations and Maintenance Manual is required by the Code of Virginia § 62.1-44.19, the Sewage Collection and Treatment Regulations, 9 VAC 25-790; and the VPDES Permit Regulation, 9 VAC 25-31-190 E.

G. Licensed Operator Requirement (Part I.C.6)

Rationale: The VPDES Permit Regulation, 9 VAC 25-31-200 C, Code of Virginia 54.1-2300 et seq., and Rules and Regulations for Waterworks and Wastewater Works Operators (18 VAC 160-20-10 et seq.) require licensure of operators. A Class III operator is required for this facility.

H. Reliability Class (Part I.C.7)

Rationale: A Reliability Class II has been assigned to this facility. Reliability class designations are required by Sewage Collection and Treatment Regulations, 9 VAC 25-790-70 for all municipal facilities.

I. Effluent Monitoring Frequencies (Part I.C.8)

Rationale: Permittees are granted a reduction in monitoring frequency based on a history of permit compliance. To remain eligible for the reduction, the permittee should not have violations related to the effluent limits for which reduced frequencies were granted. If the permittee fails to maintain the previous level of performance, the baseline monitoring frequency should be reinstated for those parameters that were previously granted a monitoring frequency reduction.

J. Sludge Reopener (Part I.C.9)

Rationale: This condition is required by VPDES Permit Regulation, 9 VAC 25-31-220 C for all permits issued to treatment works treating domestic sewage to allow incorporation of any applicable standard for sewage sludge use or disposal promulgated under section 405(d) of the Clean Water Act.

K. Sludge Use and Disposal (Part I.C.10)

Rationale: VPDES Permit Regulation, 9 VAC 25-31-100 P; 220 B2; and 420 and 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal. Technical requirements may be derived from the VPA Permit Regulation, 5 VAC 5-32-et seq. This special condition, in accordance with Guidance Memo 97-004, clarifies that the Sludge Management Plan approved with the reissuance of this permit is an enforceable condition of the permit.

L. Total Maximum Daily Load (TMDL) Reopener (Part I.C.11)

Rationale: Section 303(d) of the Clean Water Act requires that Total Maximum Daily Loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL approved for the receiving stream. The reopener recognizes that, according to Section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under Section 303 of the Act.

M. Treatment Works Closure Plan (Part I.C.12)

Rationale: In accordance with State Water Control Law § 62.1-44.19, this condition is used to notify the owner of the need for a closure plan where a treatment works is being replaced or is expected to close.

N. Permit Application Requirement (Part I.C.13)

Rationale: VPDES Permit Regulation, 9 VAC 25-31-100.D and 40 CFR 122.21(d)(1) require submission of a new application at least 180 days prior to expiration of the existing permit. In addition, the VPDES Permit Regulation, 9 VAC 25-31-100 E.1 and 40 CFR 122.21 (e)(1) note that a permit shall not be issued before receiving a complete application.

O. Polychlorinated Biphenyl (PCB) Total Maximum Daily Load (TMDL) Development (Part I.C.14)

Rationale: This special condition requires the permittee to monitor and report PCB concentrations in dry weather and wet weather effluent samples consistent with 9 VAC 25-260-280. The results from this monitoring shall be used to develop a PCB TMDL for the New River.

P. Significant Discharger Survey (Part I.D)

Rationale: VPDES Permit Regulation, 9 VAC 25-31-730 through 900, and 40 CFR Part 403 require certain existing and new sources of pollution to meet specified regulations.

Q. Conditions Applicable to All VPDES Permits (Part II)

Rationale: VPDES Permit Regulation, 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

21. Changes to the Permit:**A. The following special condition has been deleted from the permit:**

The Water Quality Standards Monitoring Special Condition (Part I.C.11) has been removed from the permit because the data have been submitted.

B. Special conditions that have been modified from the previous permit are listed below: (The referenced permit sections are for the new permit.)

1. The Total Residual Chlorine (TRC) Limitations and Monitoring Requirements Special Condition (Part I.B) has been revised to include update TRC limitations.
2. A Compliance Reporting Special Condition (Part I.C.1) has been revised to include information about significant figures.
3. The Operations and Maintenance Manual Special Condition (Part I.C.5) has been revised in accordance with the VPDES Permit Manual.

C. The following new special conditions added to the permit are listed below:

1. The Effluent Monitoring Frequencies Special Condition (Part I.C.8) has been to require that the permittee's reduced monitoring frequencies revert back to the previous frequencies if they are issued a Notice of Violation for any of the parameters with reduced monitoring.
2. A Treatment Works Closure Plan Special Condition (Part I.C.12) has been added in accordance with the VPDES Permit Manual to provide requirements in the event the facility is closed.
3. A Permit Application Requirement Special Condition (Part I.C.13) has been added to provide the specific due date for the required submittal of the application.
4. A Polychlorinated Biphenyl (PCB) Total Maximum Daily Load (TMDL) Development Special Condition (Part I.C.14) has been added to require PCB monitoring for use in the development of a PCB TMDL.
5. A Significant Discharger Survey Special Condition (Part I.D) has been added to require submission of an annual survey of industrial users into the treatment plant.

D. Permit Limits and Monitoring Requirements: See Table III on page 17 for details on changes to the effluent limits and monitoring requirements.

22. **Variances/Alternate Limits or Conditions:** No variances or alternate limits or conditions are included in this permit. For the previous permit term, the permittee had requested that the 8-hour composite data for TSS and BOD₅ collected during the permit term be used on the application in lieu of 24-hour composite samples. A waiver was requested to allow one pollutant scan instead of 3 samples for ammonia as nitrogen, TKN, and oil and grease. The permittee requested a waiver for phosphorus, total dissolved solids, nitrate plus nitrite nitrogen, and total residual chlorine. Since the receiving stream is not a public water supply or nutrient enriched there are no applicable water quality criteria for phosphorus, total dissolved solids, or nitrate plus nitrogen. Since the facility uses UV rather than chlorine for disinfection, total residual chlorine data are not applicable to this facility. These waivers were approved on March 8, 2013. The waivers are consistent with current permit requirements, and therefore the approved waivers have been applied to this reissuance application.
23. **Regulation of Treatment Works Users:** The VPDES Permit Regulation, 9 VAC 25-31-280 B9, requires that every permit issued to a treatment works owned by a person other than a state or municipality provide an explanation of the Board's decision on the regulation of users. The Town of Pembroke, a municipality, owns this treatment works; therefore this regulation does not apply. The permit requires that the facility submit a Significant Industrial Survey (Part I.D).
24. **Public Notice Information required by 9 VAC 25-31-290 D:**

All pertinent information is on file and may be inspected, and arrangements made for copying by contacting Becky L. France at:

Virginia DEQ
Blue Ridge Regional Office
3019 Peters Creek Road
Roanoke, VA 24019
540-562-6700
becky.france@deq.virginia.gov

Persons may comment in writing or by e-mail to the DEQ on the proposed permit action and may request a public hearing during the comment period. Comments shall include the name, address, and telephone number of the writer, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing if public response is significant. Requests for public hearings shall state the reason why a hearing is requested, the nature of the issues proposed to be raised in the public hearing, and a brief explanation of how the requester's interests would be directly and adversely affected by the proposed permit action.

Following the comment period, the DEQ will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given. See **Attachment J** for a copy of the public notice.

25. **303(d) Listed Segments (TMDL):** This facility discharges directly to the New River. The stream segment receiving the effluent is listed in part I of the 303(b) list for nonattainment of human health water quality standards from ingestion of PCBs found in fish tissue. The impairment begins at the I-77 bridge crossing the New River and extends downstream to the VA/WVA state line and includes tributaries of Peak and Reed Creek. A PCB TMDL is scheduled for development by 2014. This permit contains a PCB monitoring special condition (Part I.C.14) for TMDL development. A TMDL reopener special condition (Part I.C.11) has also been included in case a future PCB TMDL contains a wasteload allocation for the facility.

26. **Additional Comments:**

- A. **Reduced Effluent Monitoring:** In accordance with Guidance Memo 98-2005, all permit applications received after May 4, 1998, are considered for reduction in effluent monitoring frequency. Only facilities having exemplary operations that consistently meet permit requirements may qualify for reduced monitoring. To qualify for consideration of reduced monitoring requirements, the facility should not have been issued any Warning Letters, Letter of Noncompliance (LON) or Notices of Violation (NOV), or be under any Consent Orders, Consent Decrees, Executive Compliance Agreements, or related enforcement documents during the past three years.

The facility has not received any warning letters or NOVs. A DEQ compliance inspection conducted on December 13, 2011 identified some deficiencies related to clerical errors, calculation errors, needed updates to the Operations and Maintenance Manual, requested testing documentation, and reported a flow meter out of paper. According to a letter dated February 21, 2012, Pembroke WWTP took steps to address all of these deficiencies. A DEQ compliance inspection conducted on April 26, 2013 identified a need for increased maintenance and operation controls for solids removal and disinfection redundancy. In a letter dated April 30, 2013, the permittee noted completion of the requested operational controls. There are no outstanding compliance or enforcement issues at this treatment facility. Therefore, the permittee qualifies for a reduced monitoring data evaluation.

- B. **Previous Board Action:** None

- C. **Staff Comments:** The discharge is not controversial, and is in conformance with the existing planning document for the area. The permit is being reissued for a period of slightly less than five years to even out the DEQ staff permitting workload.

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has identified natural heritage resources in the project area. The candy darter and hellbender have been historically documented in the New River. DCR commented that habitat alteration from impoundments or channelization and water pollution threatens hellbenders. DCR supports the use of UV disinfection at this facility. The facility currently uses UV disinfection and is required to dechlorinate if they decide to use chlorine disinfection in the future.

On August 13, 2013 the schedule for submission of PCB data in Part I.C.14 of the permit was revised to provide the data earlier for use in the TMDL study of the New River.

D. **Public Comments:** No comments were received during the public comment period.

E. **Tables**

| | |
|-----------|---|
| Table I | Discharge Description (Page 2) |
| Table II | Basis for Monitoring Requirements (Page 16) |
| Table III | Permit Processing Change Sheet (Page 17) |

F. **Attachments**

- A. Flow Frequency Memorandum
- B. Wastewater Schematic
- C. Site Inspection Report
- D. USGS Topographic Map
- E. Ambient Water Quality Information
 - STORET Data (Station 9-NEW030.15)
 - STORET Data (Station 9-NEW056.22)
 - 2010 Impaired Waters Summary (Excerpt)
 - 1976 New River Basin Comprehensive Water Resources Plan (Excerpt)
 - Endangered Species Information
- F. Effluent Data
- G. Wasteload and Limit Calculations
 - Mixing Zone Calculations (MIXER)
 - Antidegradation Wasteload Allocation Spreadsheet
 - STATS Program Results
- H. Reduced Monitoring Evaluation Memorandum
- I. Regional Water Quality Model (Version 4.0)
- J. Public Notice
- K. EPA Checksheet

Table II
BASIS FOR LIMITATIONS – MUNICIPAL

() Interim Limitations
(x) Final Limitations

OUTFALL: 001
DESIGN CAPACITY: 0.20 MGD

Effective Dates - From: Effective Date
To: Expiration Date

| PARAMETER | BASIS FOR LIMITS | DISCHARGE LIMITS | | | | MONITORING REQUIREMENTS | |
|------------------------|------------------|------------------------------------|-----------------|---------|---------|---|-------------|
| | | Monthly Average | Weekly Average | Minimum | Maximum | Frequency | Sample Type |
| Flow (MGD) | NA | NL | NA | NA | NL | Continuous | TIRE |
| pH (Standard Units) | 1,2 | NA | NA | 6.0 | 9.0 | 1/Day | Grab |
| BOD ₅ | 1 | 30 mg/L 22 kg/d | 45 mg/L 34 kg/d | NA | NA | 1/Week | 8 HC |
| Total Suspended Solids | 1 | 30 mg/L 22 kg/d | 45 mg/L 34 kg/d | NA | NA | 1/Week | 8 HC |
| <i>E. coli</i> | 2 | 126 cfu/100 mL (geometric mean) | NA | NA | NA | 3 Days/Week (between 10 am and 4 pm) | Grab |

NA = Not Applicable
NL = No Limitations; monitoring only
8HC= 8 hour composite
TIRE = totalizing, indicating, recording equipment

The basis for the limitations codes are:

1. Federal Technology-Based Secondary Treatment Regulation (40 CFR Part 133)
2. Water Quality Criteria

Table III
PERMIT PROCESSING CHANGE SHEET

LIMITS AND MONITORING SCHEDULE:

| Outfall No. | Parameter Changed | Monitoring Requirement Changed | | Effluent Limits Changed | | Reason for Change | Date |
|-------------|---|--------------------------------|---------------------------|--|--|--|---------|
| | | From | To | From | To | | |
| 001 | BOD ₅ | 3 Days/Week | 1/Week | | | Monitoring data supports a reduced monitoring frequency of 1/week. | 3/20/13 |
| 001 | TSS | 3 Days/Week | 1/Week | | | Monitoring data supports a reduced monitoring frequency of 1/week. | 3/20/13 |
| 001 | <i>E. coli</i> (applicable when ultraviolet used as disinfection) | 1/Week | 3 Days/Week | | | Monitoring frequency increased in accordance with VPDES Permit Manual. | 3/20/13 |
| 001 | Total Residual Chlorine (only applicable if chlorine used for disinfection) | 1/Day | 3/Day at 4 hour intervals | 0.13 mg/L monthly average and 0.16 mg/L weekly average | 0.12 mg/L monthly average and 0.14 mg/L weekly average | STATS program determined that more stringent limits were needed to protect water quality of the receiving stream. The monitoring frequency increased in accordance with VPDES Permit Manual. | 3/20/13 |

Attachment A

Flow Frequency Memorandum

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
3019 Peters Creek Road, Roanoke, Virginia 24019

SUBJECT: Flow Frequency Determination
Pembroke WWTP – Reissuance (VA0088048)

TO: Permit File

FROM: Becky L. France, Water Permit Writer *BJF*

DATE: March 19, 2013

This memorandum supercedes the July 30, 2008 memorandum concerning the subject VPDES permit. Pembroke WWTP discharges to the New River near Pembroke, Virginia. Stream flow frequencies are required at this site to develop effluent limitations for the VPDES permit.

The USGS has operated a continuous record gauge on the New River near Eggleston, Virginia (#30171500) from 1915 to 1976. The gauge is located at the Route 730 bridge in Eggleston, Virginia. Flow has been regulated at the gauge by Claytor Reservoir since 1940. This gauge is located approximately 4 miles upstream of the discharge point. The nearest downstream continuous record gauge on the New River is located at Glen Lyn, Virginia (#03176500), and has been operating since 1927. There are several discharges and withdrawals between the discharge point and the Glen Lyn gauge.

Since there is no current flow information for the Eggleston, Virginia gauge, flow frequencies for the gauge were determined by calculating a ratio of the Glen Lyn and Eggleston gauge data from the same period of record (1940-1976) and multiplying the ratio by the current flow frequencies at Glen Lyn. To solve for the flow frequencies at the discharge point, a ratio of the drainage area of the gauge (Eggleston) and the discharge point were used to calculate the flow at the discharge point.

The high flow months are January through May. The flow frequencies for the discharge point are listed on the attached table.

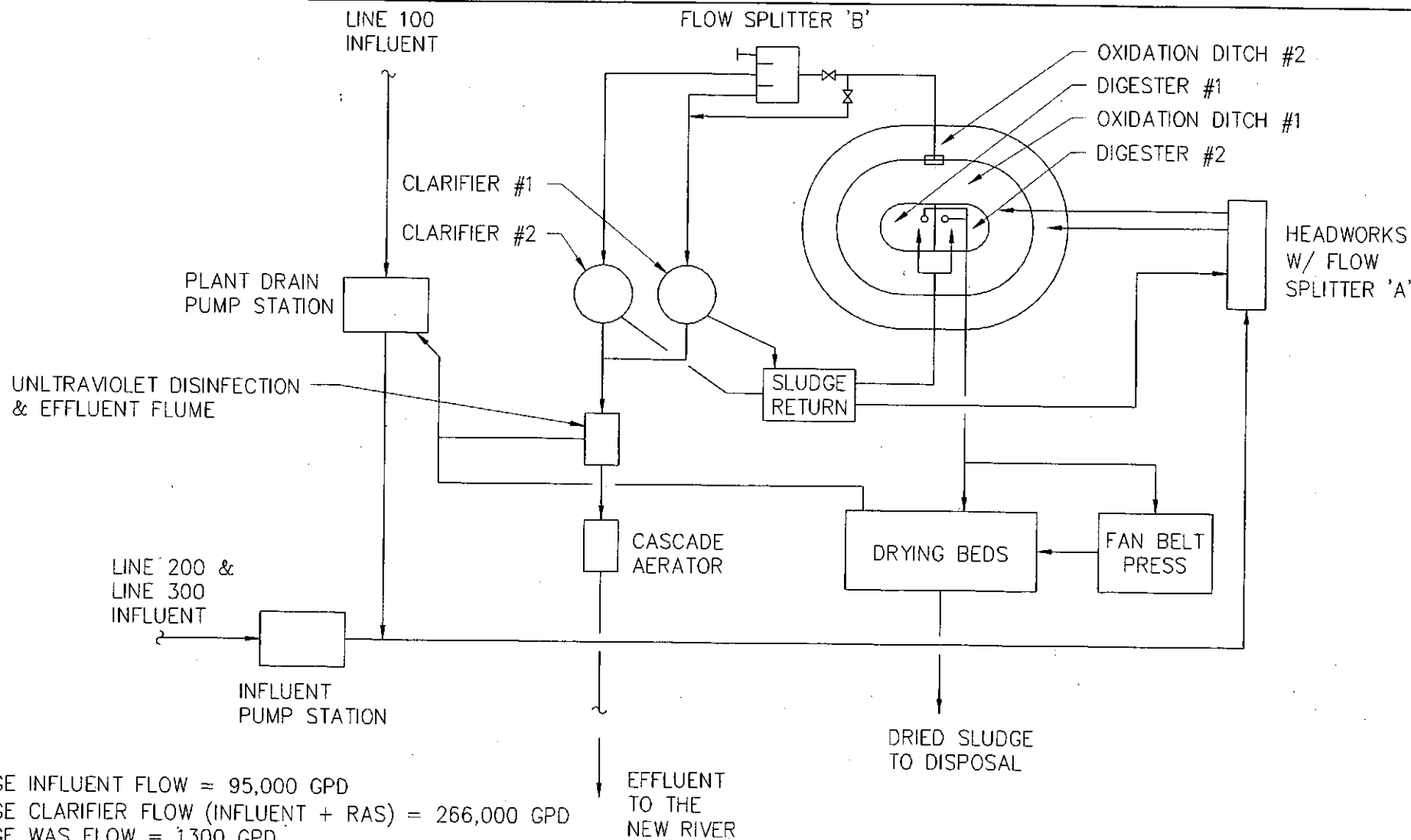
Flow Frequency Determination: Pembroke WWTP

| | A | B | C | D | E | F | G | H | I | J | K | L | M |
|----|--|---|-----|-------------------|--------------------|-------|---|--|--------------------|-------|-------------------|--------------------|-------|
| 1 | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | |
| 6 | Reference Gauge (data from 1940 to 1976) | | | | | | | Flow frequencies for the reissued permit (11/16/13) | | | | | |
| 7 | New River at Eggleston, VA (#03171500) | | | | | | | New River at Discharge Point | | | | | |
| 8 | | Drainage Area [mi ²] = 2,961 | | | | | | Drainage Area [mi ²] = | | 3,035 | | | |
| 9 | | ft ³ /s | MGD | | ft ³ /s | MGD | | | ft ³ /s | MGD | | ft ³ /s | MGD |
| 10 | 1Q10 = | 701 | 453 | High Flow 1Q10 = | 959 | 620 | | 1Q10 = | 630 | 407 | High Flow 1Q10 = | 928 | 600 |
| 11 | 7Q10 = | 883 | 571 | High Flow 7Q10 = | 1,285 | 830 | | 7Q10 = | 752 | 486 | High Flow 7Q10 = | 1,294 | 836 |
| 12 | 30Q5 = | 1,184 | 765 | HM = | 2,575 | 1,664 | | 30Q5 = | 1,095 | 708 | HM = | 2,484 | 1,605 |
| 13 | 30Q10 = | 1,041 | 673 | High Flow 30Q10 = | 1,751 | 1,132 | | 30Q10 = | 928 | 600 | High Flow 30Q10 = | 1,682 | 1,087 |
| 14 | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | |
| 16 | Reference Gauge (data from 1940 to 1976) | | | | | | | Solving for current flow at Eggleston (data from 1940 to 2011) | | | | | |
| 17 | New River at Glen Lyn, VA (#03176500) | | | | | | | New River at Eggleston, VA (#03171500) | | | | | |
| 18 | | Drainage Area [mi ²] = 3,783 | | | | | | Drainage Area [mi ²] = | | 2,961 | | | |
| 19 | | ft ³ /s | MGD | | ft ³ /s | MGD | | | ft ³ /s | MGD | | ft ³ /s | MGD |
| 20 | 1Q10 = | 1,001 | 647 | High Flow 1Q10 = | 1,250 | 808 | | 1Q10 = | 615 | 397 | High Flow 1Q10 = | 905 | 585 |
| 21 | 7Q10 = | 1,218 | 787 | High Flow 7Q10 = | 1,629 | 1,053 | | 7Q10 = | 734 | 474 | High Flow 7Q10 = | 1,262 | 816 |
| 22 | 30Q5 = | 1,490 | 963 | HM = | 3,188 | 2,060 | | 30Q5 = | 1,069 | 691 | HM = | 2,423 | 1,566 |
| 23 | 30Q10 = | 1,370 | 885 | High Flow 30Q10 = | | 0 | | 30Q10 = | 905 | 585 | High Flow 30Q10 = | 1,641 | 1,061 |
| 24 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 26 | Reference Gauge (data from 1940 to 2011) | | | | | | | | | | | | |
| 27 | New River at Glen Lyn, VA (#03176500) | | | | | | | | | | | | |
| 28 | | Drainage Area [mi ²] = 3,783 | | | | | | | | | | | |
| 29 | | ft ³ /s | MGD | | ft ³ /s | MGD | | | | | | | |
| 30 | 1Q10 = | 878 | 567 | High Flow 1Q10 = | 1,180 | 763 | | | | | | | |
| 31 | 7Q10 = | 1,012 | 654 | High Flow 7Q10 = | 1,600 | 1,034 | | | | | | | |
| 32 | 30Q5 = | 1,345 | 869 | HM = | 3,000 | 1,939 | | | | | | | |
| 33 | 30Q10 = | 1,191 | 770 | High Flow 30Q10 = | 2,160 | 1,396 | | | | | | | |
| 34 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | |
| 37 | No high flow 30Q10 data available for Reference Station 03176500 for 1940-1976, so ratio for high flow 30Q10 | | | | | | | | | | | | |
| 38 | gauge stations assumed to be the same as for the low flow 30Q10. | | | | | | | | | | | | |

| SITEID | NAME | RECORD | LATLONG | DAAREA | HARMEAN | HF30Q10 | HF7Q10 | HF1Q10 | Z30Q5 | Z30Q10 | Z7Q10 | Z1Q10 | Z1Q30 | HFMTHS | Statperiod | Yrstrn | NOTES |
|----------|--------------------------------------|------------|---|--------|---------|---------|--------|--------|-------|--------|-------|-------|-------|---------|------------|--------|--|
| 03171500 | New River at Eggleston, Va. | R, 1915-76 | Lat 37 17'22", Long 80 37'00", NAD 83 | 2961 | 2575 | 1751 | 1285 | 959 | 1184 | 1041 | 883 | 701 | ----- | JAN-MAY | 1940-1976 | 2012 | Flow Regulated since 1939 by Claytor Reservoir |
| 03176500 | New River at Glen Lyn, Va. | R, 1927- | Lat 37 22'22", Long 80 51'38", NAD 83 | 3783 | 3000 | 2160 | 1600 | 1180 | 1345 | 1191 | 1012 | 878 | 790 | JAN-MAY | 1940-2011 | 2012 | Flow Regulated since 1939 by Claytor Reservoir |

Attachment B

Wastewater Schematic



AVERAGE INFLUENT FLOW = 95,000 GPD
 AVERAGE CLARIFIER FLOW (INFLUENT + RAS) = 266,000 GPD
 AVERAGE WAS FLOW = 1300 GPD
 TOTAL TO DRYING BEDS = 1000 GPD
 AVERAGE TO ULTRAVIOLET = 97,000 GPD
 AVERAGE DISCHARGE = 94,000 GPD

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TOWN OF PEMBROKE WASTEWATER TREATMENT PLANT

PROCESS FLOW DIAGRAM

PROJECT NO.
 25015

DATE: FEB 2013

FIGURE 3

Attachment C

Site Inspection Report

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Blue Ridge Regional Office

3019 Peters Creek Road

Roanoke, VA 24019

SUBJECT: Site Inspection Report for Pembroke WWTP
Reissuance of VPDES Permit No. VA0088048

TO: Permit File

FROM: Becky L. France, Water Permit Writer *BJF*

DATE: April 16, 2013

On April 16, 2013, a site inspection of the Pembroke WWTP was conducted. Mr. Stanley Lucas, operator, was present at the inspection.

Pembroke WWTP consists of a comminutor, bar screen, grit chamber, two oxidation ditches, two clarifiers, ultraviolet disinfection system, cascade aerator, two aerobic digesters, and four sludge drying beds. The facility is currently operating only one of the oxidation ditches. This 0.20 MGD facility began operation in 1996.

Wastewater enters the plant from a 6-inch force main and flows through a comminutor chamber and manual bar screen channel. Then, the wastewater passes through a grit removal chamber. Grit is removed to a sump for dewatering. At the time of the site visit, the grit chamber was not operational. The wastewater then flows to an oxidation ditch which is aerated by an aeration rotor assembly. Due to low effluent flows, only the inner oxidation ditch is currently used. At the time of the site visit, the wastewater had a chocolate color. From the oxidation ditch the wastewater enters two parallel clarifiers. There were no visible solids being carried over the weir. From the clarifier, the wastewater overflows the weir and is routed to one of the two ultraviolet light banks. Disinfected effluent flows through a trough into a cascade aerator and is discharged into the New River. A flow meter continuously records effluent flow within a Parshall flume which is located at the end of the trough. At the time of the site visit, the cascade steps were clean, and the effluent appeared clear.

Sludge that is collected in the clarifiers is periodically pumped to the aerated aerobic digesters. The digesters' coarse bubble air diffuser system operates on a timer. Sludge is removed from the digesters by sludge pumps and transferred to the four sludge drying beds. A blanket of sludge is applied to the covered sludge drying beds. Underdrainage from the sludge drying beds and decant from the sludge digester are returned to the oxidation ditch. The caked sludge, which should be at least 20 percent solids, is removed and disposed of in a landfill. According to Mr. Lucas, sludge is currently being hauled to the landfill approximately once a month.



CIA

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**Town of Pembroke
Wastewater Treatment Plant
Site Layout
Figure 2**



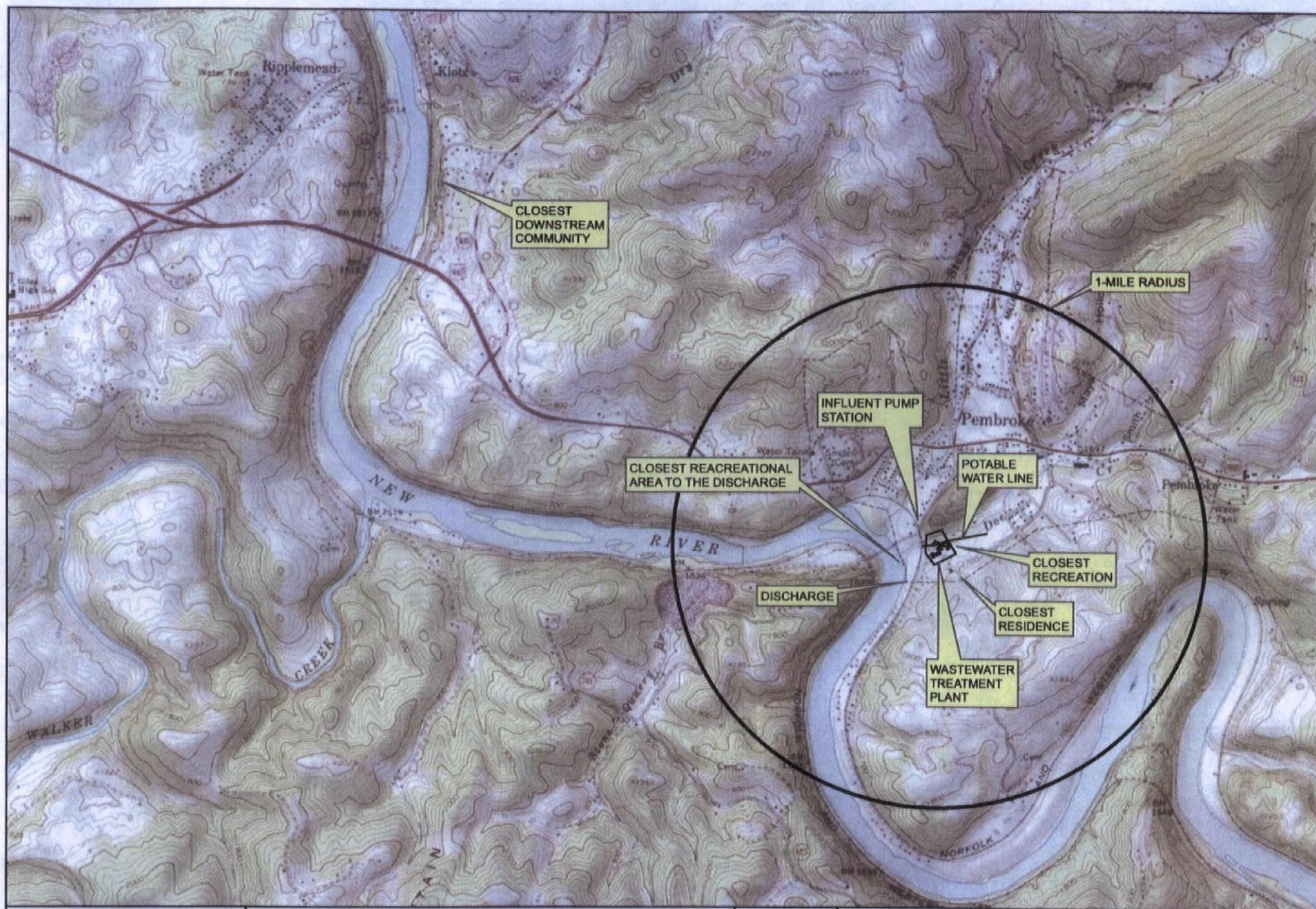
Project No.
25015

Date : February 2013

0 100
Ft

Attachment D

US Topographic Map



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Town of Pembroke Wastewater Treatment Plant

Figure 1



Project No.
25015

Date : February 2013

0 2,500
Ft

U.S. NATIONAL GRID
NB 17S
PEARISBURG QUADRANGLE

Attachment E

Ambient Water Quality Information

- **STORET Data (Station 9-NEW030.15)**
- **STORET Data (Station 9-NEW056.22)**
- **2010 Impaired Waters Summary
(Excerpt)**
- **1976 New River Basin Comprehensive
Water Resources Plan (Excerpt)**
- **Endangered Species Information**

VAW-N29R
9-NEW030.15

| Collection Date Time | pH (S.U.) |
|----------------------|-----------|
| 02/12/2004 10:25 | 8.17 |
| 04/27/2004 10:00 | 8.12 |
| 06/15/2004 09:30 | 7.65 |
| 08/25/2004 11:00 | 8.2 |
| 10/26/2004 11:40 | 7.81 |
| 12/16/2004 10:40 | 7.86 |
| 02/15/2005 11:40 | 7.63 |
| 04/13/2005 10:25 | 7.75 |
| 06/14/2005 10:30 | 7.8 |
| 08/15/2005 10:15 | 8.4 |
| 10/18/2005 11:00 | 8.04 |
| 12/13/2005 10:45 | 6.8 |
| 02/09/2006 09:30 | 8.1 |
| 04/11/2006 10:10 | 7.4 |
| 08/15/2006 10:45 | 8 |
| 12/11/2006 11:25 | 8.1 |
| 01/18/2007 11:00 | 8.2 |
| 03/27/2007 11:50 | 7.1 |
| 05/17/2007 10:50 | 7.7 |
| 07/11/2007 11:35 | 8 |
| 09/11/2007 11:30 | 8 |
| 11/28/2007 11:00 | 7.5 |
| 01/15/2008 13:05 | 7.9 |
| 03/25/2008 12:35 | 7.9 |
| 05/20/2008 12:15 | 8.1 |
| 07/09/2008 12:20 | 7.4 |
| 09/02/2008 12:15 | 7.2 |
| 11/19/2008 09:25 | 7.1 |
| 01/22/2009 11:25 | 6.5 |
| 03/10/2009 09:25 | 7 |
| 05/12/2009 13:40 | 8.1 |
| 07/21/2009 11:05 | 6.8 |
| 09/21/2009 09:25 | 7.7 |
| 11/17/2009 11:40 | 7 |
| 01/28/2010 09:50 | 8 |
| 03/24/2010 11:40 | 8.2 |
| 05/26/2010 11:55 | 7.8 |
| 07/20/2010 12:15 | 8.1 |
| 09/02/2010 11:45 | 8.5 |
| 11/18/2010 10:50 | 8.4 |
| 01/18/2011 14:25 | 7.9 |
| 03/08/2011 12:20 | 7.4 |
| 05/05/2011 13:45 | 7.7 |
| 07/12/2011 12:20 | 8.1 |
| 09/20/2011 12:25 | 8.3 |
| 11/02/2011 12:45 | 8.3 |
| 01/17/2012 12:25 | 7.9 |
| 04/26/2012 12:15 | 7.9 |
| 06/25/2012 12:45 | 8.7 |
| 08/21/2012 12:40 | 8.5 |
| 10/25/2012 10:40 | 8.1 |
| 12/18/2012 12:35 | 7.9 |
| 01/15/2013 11:15 | 7.6 |

90th Percentile pH
10th Percentile pH

8.3 S.U.
7.1 S.U.

VAW-N29R
9-NEW030.15

| Collection Date Time | Hardness, Total (mg/L as CaCO ₃) |
|-------------------------|---|
| 01/28/1999 10:45 | 54 |
| 02/10/1999 10:45 | 60 |
| 03/30/1999 12:40 | 70 |
| 04/26/1999 11:10 | 78 |
| 05/10/1999 10:50 | 60 |
| 06/22/1999 11:10 | 71 |
| 07/26/1999 12:00 | 78.4 |
| 08/17/1999 11:20 | 87.2 |
| 09/21/1999 11:30 | 80.9 |
| 10/13/1999 10:40 | 75.2 |
| 11/16/1999 11:30 | 66.7 |
| 12/14/1999 09:30 | 64.1 |
| 01/26/2000 11:00 | 72.3 |
| 02/14/2000 11:25 | 52.5 |
| 03/29/2000 10:20 | 59 |
| 04/06/2000 11:40 | 47 |
| 05/24/2000 11:05 | 63 |
| 06/26/2000 11:30 | 75.4 |
| 07/25/2000 10:00 | 72.4 |
| 08/29/2000 12:00 | 80 |
| 09/26/2000 11:00 | 82 |
| 10/11/2000 12:00 | 87.1 |
| 11/20/2000 10:40 | 82.6 |
| 12/20/2000 10:00 | 58.9 |
| 01/30/2001 08:20 | 82 |
| 02/21/2001 12:50 | 56.4 |
| 03/15/2001 11:00 | 45 |
| 04/16/2001 13:10 | 30.3 |
| 05/08/2001 12:45 | 61.4 |
| 06/21/2001 14:30 | 61.1 |
| 07/17/2001 14:00 | 98.9 |
| 08/15/2001 10:00 | 69.2 |
| 09/11/2001 14:20 | 43.4 |
| 10/25/2001 11:00 | 60.6 |
| 11/27/2001 09:10 | 57.9 |
| 12/18/2001 11:10 | 68.2 |
| 02/25/2002 11:15 | 36 |
| 03/14/2002 10:55 | 75.5 |
| 04/29/2002 13:30 | 65.9 |
| 05/30/2002 12:30 | 77.3 |
| 06/25/2002 11:45 | 96.9 |
| 07/30/2002 09:00 | 88.7 |
| 08/21/2002 10:55 | 91.3 |
| 09/24/2002 13:20 | 54.4 |
| 10/28/2002 14:20 | 78.2 |
| 11/21/2002 09:30 | 50.5 |
| 12/12/2002 10:00 | 55.3 |
| 01/22/2003 11:30 | 84.5 |
| 02/11/2003 11:15 | 75.1 |
| 03/13/2003 14:30 | 67.5 |
| 04/10/2003 11:45 | 54.9 |
| 06/12/2003 11:30 | 63.1 |

Mean Hardness 67.8 mg/L

| | |
|---|-------|
| 1/23/02 | 10U |
| 1/23/02 | 306.3 |
| These data used in data set considered outliers. | |

VAW-N23R

9-NEW056.22

Route 730 Bridge at Eggleston Gauge (Above Celanese Plant)

| Collection Date Time | Temp (°C) |
|----------------------|-----------|
| 01/26/2000 11:50 | 0.7 |
| 02/14/2000 12:30 | 4.6 |
| 03/29/2000 09:20 | 7.2 |
| 04/06/2000 12:50 | 13.1 |
| 05/24/2000 12:30 | 19.5 |
| 05/24/2000 12:35 | 19.5 |
| 06/26/2000 12:15 | 25.4 |
| 07/25/2000 08:25 | 20 |
| 08/29/2000 11:10 | 22.4 |
| 09/26/2000 08:30 | 17.5 |
| 10/11/2000 11:00 | 12 |
| 11/20/2000 08:00 | 4.1 |
| 12/20/2000 09:00 | 0.8 |
| 01/30/2001 11:30 | 5.4 |
| 02/21/2001 12:00 | 8 |
| 03/15/2001 08:20 | 8.4 |
| 04/16/2001 12:20 | 11.9 |
| 05/08/2001 14:15 | 16.8 |
| 06/21/2001 13:00 | 23.1 |
| 08/15/2001 08:50 | 22 |
| 10/25/2001 09:30 | 15.9 |
| 12/18/2001 09:50 | 8.7 |
| 02/25/2002 09:30 | 4.8 |
| 04/29/2002 14:00 | 15.66 |
| 06/25/2002 13:05 | 28.26 |
| 08/21/2002 11:20 | 25.92 |
| 10/28/2002 15:00 | 15 |
| 12/12/2002 11:30 | 5.54 |
| 02/11/2003 12:20 | 3.4 |
| 04/10/2003 12:30 | 9.7 |
| 06/12/2003 12:25 | 19.56 |
| 01/18/2007 12:00 | 4.6 |
| 03/27/2007 12:30 | 13.8 |
| 05/17/2007 12:15 | 17.2 |
| 07/11/2007 13:05 | 24.8 |
| 09/11/2007 13:05 | 24 |
| 11/28/2007 12:20 | 8.3 |
| 01/15/2008 13:50 | 4.7 |
| 03/25/2008 13:10 | 8.6 |
| 05/20/2008 13:00 | 16.2 |
| 07/09/2008 14:00 | 24.1 |
| 09/02/2008 13:15 | 24.2 |
| 11/19/2008 10:05 | 4.2 |
| 01/20/2011 13:30 | 4.3 |
| 03/24/2011 12:05 | 10.9 |
| 05/11/2011 13:05 | 18.4 |
| 07/19/2011 13:30 | 25.1 |
| 09/15/2011 13:05 | 22.5 |
| 11/29/2011 14:00 | 11.6 |
| 01/25/2012 14:45 | 5.5 |
| 04/03/2012 14:10 | 16 |
| 06/19/2012 12:45 | 23.2 |
| 08/22/2012 14:00 | 24.1 |
| 10/17/2012 13:20 | 15.7 |
| 12/12/2012 14:30 | 8.1 |

90th percentile temperature

24.2 °C

90th percentile temperature (Jan. - May)

17.0 °C

VAW-N29R

STORET Station 9-NEW030.15

New River PCB Data

| Collection Date Time | PCBs Total, Sediment (ug/kg dry wt.) |
|---------------------------------|---|
| 7/16/1996 12:35 | 30U |
| 7/9/1997 12:20 | 30U |
| 8/12/1998 14:05 | 100 |
| 5/24/2000 11:10 | 80J |

U= Indicates material was analyzed for but not above detection

J=Estimated Value

VAW-N29R

STORET Station 9-NEW030.15

New River Dissolved Metals Data (ug/l)

| Collection Date Time | As | Cd | Cr | Cu | Fe | Pb | Mn | Tl | Ni | Ag | Zn | Sb | Al | Se | Hg-TL filtered, ultrace metal method NG/L | Hg |
|-------------------------|------|------|------|----|-----|------|-----|------|------|------|----|------|-----|------|--|------|
| 10/23/1997 13:00 | 0.68 | <0.1 | 0.17 | 1 | <10 | <0.1 | 3.4 | <0.1 | 0.44 | <0.1 | <1 | <0.1 | 3.4 | <0.5 | | <0.2 |
| 6/26/2001 10:00 | | | | | <50 | U | | <0.2 | U | | | | | | <1.5 | |



2010 Impaired Waters

Categories 4 and 5 by DCR Watershed*

New River Basin

Fact Sheet prepared for DCR Watershed: N29*

Cause Group Code: N29R-01-PCB

New River, Claytor Lake, Peak Creek, Reed Creek and Stony Creek

Location: The impairment begins at the I-77 bridge crossing the New River and extends downstream to the VA/WVA State Line and includes the tributaries Peak Creek, Reed Creek and Stony Creek as described below.

City / County: Giles Co.

Montgomery Co.

Pulaski Co.

Radford City

Use(s): Fish Consumption

Cause(s) /

VA Category: PCB in Fish Tissue/ 5A

The Virginia Department of Health (VDH) issued a fish consumption advisory on August 6, 2001 for polychlorinated biphenyls (PCBs) for the lower portion of the New River (Rt. 114 Bridge downstream to the VA / WVA State Line - 52.0 miles) based on fish tissue collections from Carp. An Advisory extension to Claytor dam was issued 8/06/2003 (11.47 miles) recommends that no carp be consumed in these waters and no more than two meals per month of flathead and channel catfish. The VDH PCB Fish Consumption Advisory was further extended upstream on the New River (13 miles) to the I-77 Bridge to include the lower portions of Peak Creek (4.02 miles), Reed Creek (16.35 miles) and Claytor Lake (4,287 acres) on 12/02/2004. The VDH advises consumption should not exceed two meals per month for carp and smallmouth bass. The VDH level of concern is 50 parts per billion (ppb) in fish tissue.

There are eight fish tissue collection sites within the 2010 data window reporting exceedances of the WQS based 20 ppb fish tissue value (TV) (VDH 50 ppb). These data are reviewed by the VDH in making an advisory determination. A complete listing of collection sites and associated fish tissue data are available at <http://www.deq.virginia.gov/fishtissue/fishtissue.html>. A more detailed presentation of the data can also be found using an interactive mapping application at <http://gisweb.deq.state.va.us/>. The VDH Advisory information is also available via the web at <http://www.vdh.virginia.gov/Epidemiology/PublicHealthToxicology/Advisories/>.

9-SNC000.20- 2004 fish tissue finds with application of the new WQS TV for PCB (20 ppb) the addition of 3 species exceeding the new TV criterion. Rock Bass (size 16-20 cm) at 25.21, SM Bass (size 28.6-30.5 cm) at 22.13 and White sucker (1 fish) at 30.08 ppb. Stony Creek is therefore a 2010 addition based on the new WQS PCB tissue value of 20 ppb.

| Assessment Unit / Water Name / Description | Cause Category / Name | Nested | Cycle First Listed | TMDL Schedule or EPA Approval | Size |
|--|-----------------------|--------|--------------------|-------------------------------|------|
| VAW-N29R_NEW01A02 / New River / New River mainstem from the backwaters of Bluestone Reservoir, Route 460, to the confluence of Rich Creek. | 5A PCB in Fish Tissue | | 2002 | 2014 | 3.19 |
| VAW-N29R_NEW02A02 / New River / New River mainstem from the mouth of Rich Creek upstream to the confluence of Wolf Creek. | 5A PCB in Fish Tissue | | 2002 | 2014 | 3.52 |
| VAW-N29R_NEW03A02 / New River / New River mainstem from the confluence of Wolf Creek upstream to the Celanese Acetate Plant outfalls. | 5A PCB in Fish Tissue | | 2002 | 2014 | 2.79 |
| VAW-N29R_NEW04A02 / New River / New River mainstem from the Celanese Acetate Plant outfalls upstream to the watershed boundary at the confluence of Stony Creek. | 5A PCB in Fish Tissue | | 2002 | 2014 | 5.72 |

New River, Claytor Lake, Peak Creek, Reed Creek and Stony Creek

DCR Watershed: N29*

Estuary
(Sq. Miles)

Reservoir
(Acres)

River
(Miles)

PCB in Fish Tissue - Total Impaired Size by Water Type:

15.22



2010 Impaired Waters

Categories 4 and 5 by DCR Watershed*

New River Basin

Fact Sheet prepared for DCR Watershed: N29*

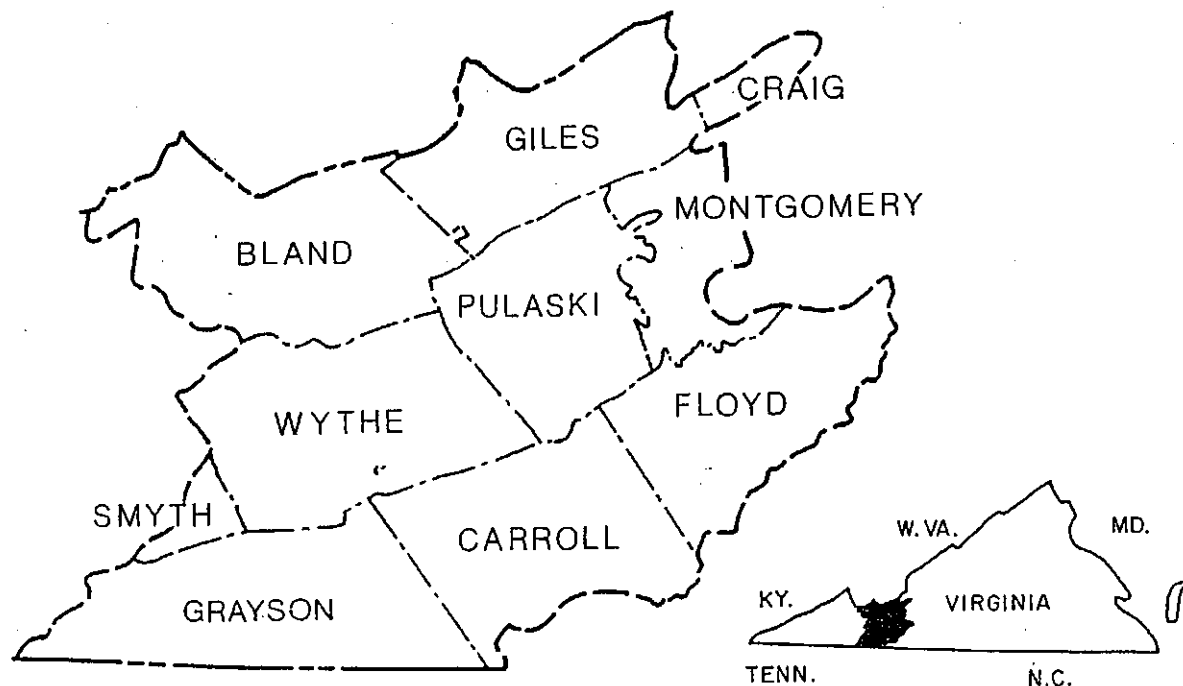
Sources:

Source Unknown

*Header Information: Location, City/County, Cause/VA Category and Narratives; describe the entire extent of the Impairment. Sizes presented are for Assessment Units (AUs) lying within the DCR Watershed boundary noted above.

STATE WATER CONTROL BOARD AT

NEW RIVER BASIN



COMPREHENSIVE WATER RESOURCES PLAN

VOLUME V-A

Part 2 of 3

RIVER BASIN WATER QUALITY MANAGEMENT PLAN

Planning Bulletin 205A

1976

VSWCB/PB/Q9/W-76/2

1. Incorporation of the community and implementation of the plan by the Town.
2. Formation of a board or authority to implement the plan.
3. Implementation of the plan by the Giles County Public Service Authority.

The Giles County Public Service Authority is the recommended implementing body. The authority would install, maintain, and operate the proposed system. A block diagram of the proposed facility is presented in Plate 65 and the sewer plan layout is presented in Plate 66.

Future Improvements. No future improvements will be needed if the selected alternative is implemented.

Receiving Stream Segment Classification. Sinking Creek is classified as follows:

| | |
|---------------------|---------------------|
| Past Classification | Effluent Limitation |
| New Classification | Effluent |
| (Tables 13 & 148) | (1974 through 1980) |
| | Effluent Limitation |
| | (1980 through 2020) |

Pembroke Planning Area

Planning Area Description. (See Plate 12) The Pembroke Planning Area includes the Town of Pembroke and the area extending east of Pembroke along U. S. Route 460 to Hoges Chapel and north of the corporate limits along Virginia Route 623. The present population of 1,485 is projected to increase to 2,000 by 2020 (Table 28).

Existing Systems. Pembroke is presently served by septic tank-field line systems and cesspools. There are no existing central sewer facilities in the planning area.

Water Quality Problems. Stream assimilation modeling indicates that there are no BOD related water quality problems within the planning area (see Plate A-1, Appendix A).

The presence of sewage from improperly operating septic tank-drain field systems has created a situation which may be potentially dangerous to public health. It is doubtful that the existing systems that are functioning adequately can continue to do so throughout the study period. A more detailed study, such as the 201 Plan, is needed to evaluate the effect of septic tank systems on groundwater and surface water.

Degree of Treatment Required. Table 58 indicates that the maximum effluent BOD load for the Pembroke Planning Area is 62.5-pounds per day. Based on this effluent limit and the sanitary raw wasteloads projected in Chapter III, a treatment level of 87.5 percent BOD removal will be required in 2020.

The minimum treatment level required by the Virginia State Water Control Board is secondary treatment or 87.5 percent BOD removal. This level of treatment will be satisfactory through 2020.

Alternative Solutions. Based on per capita flows of 100 gallons per day in 2020, the design flow for the Pembroke Planning Area is

0.157 million gallons per day for 1974 and 0.350 million gallons per day in 2020. The BOD loading ranges from 303 pounds per day in 1974 to 500 pounds per day in 2020 (Table 58).

The "Logic Diagram for Determination of Selected Alternatives" described in Chapter IV and illustrated on Plate 11-A indicates that Route "C" should be used for further analysis of this planning area.

The following alternatives were considered for resolving water quality problems in the area:

Alternative 1. (M/R Plan Solution) Construction of a collection system and a 0.275 million gallon per day sewage treatment plant is recommended. This is the measure recommended by the New River Valley Water Quality Management Plan.

Alternative 2. Retention of the septic tank-field line systems.

Review and Testing of Alternatives. Alternative 1, construction of a sewage treatment plant has been evaluated in terms of cost-effectiveness and environmental impact.

Alternative 2, retention of the existing system, would not solve the potential health problem and would be counter to requirements of water quality control, therefore, its cost has not been included.

A cost estimate for Alternative 1 is presented in Table 217. Total project cost is \$1,857,330, while monthly user cost is \$8.20 per connection. Total present worth is \$2,226,238.

The environmental score for this alternative is +1804 and is tabulated in Table 218. A detailed discussion of the scoring system is presented in Appendix C.

The proposed system could be implemented by the Town or the Giles County Public Service Authority.

Selected Plan. The selected plan for the Pembroke area is Alternative 1: construction of a 275,000 gallon per day sewage treatment plant and collection system which will serve residents inside the corporate limits of the Town of Pembroke, the area east of Pembroke to Hogs Chapel, and the area along Virginia Route 623, north of town. A cost estimate for the selected alternative is given in Table 217. The system will initially serve approximately 400 connections at a monthly cost per connection of \$8.20. Total project cost for the facility is \$1,857,330.

The treatment plant will be capable of removing 87.5 percent BOD. Initial flows should average 140,000 gallons per day. Wastewater effluent having an initial BOD loading of 35 pounds per day will be discharged into New River near rivermile 27.0. A block diagram of the proposed facilities is shown in Plate 67.

Implementation by the Town of Pembroke is recommended. A map showing proposed improvements is presented in Plate 68.

Future Improvements. Future extensions to this system are planned along Virginia Route 626, south of town, by 1990. The proposed 1990

extensions will serve an additional 35 connections at a total project cost of \$140,000. A preliminary cost estimate is presented in Table 219.

Wasteflow projections indicate that an expansion of treatment facilities may be necessary around the year 2000. This expansion would be around 75,000 gallons per day if projections hold true. Further evaluation at a future date when the accuracy of the wasteflow projections can be better determined is recommended.

Receiving Stream Segment Classification. The New River is classified as follows:

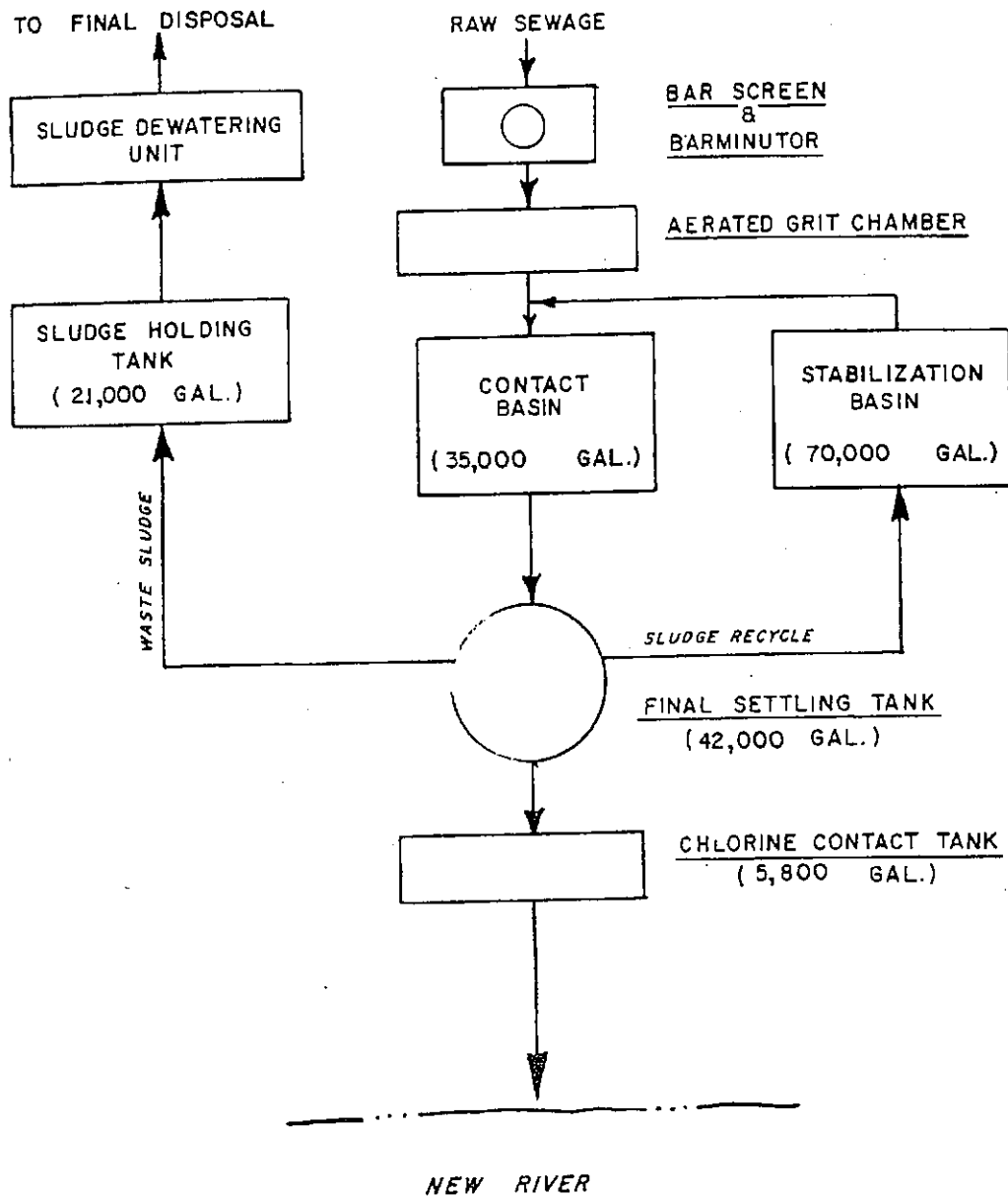
| | |
|---------------------|---------------------|
| Past Classification | Effluent Limitation |
| New Classification | Effluent Limitation |
| (Tables 12 & 147) | (1974 through 2020) |

Bland Planning Area

Planning Area Description (see Plate 12). The Bland Planning Area includes the community of Bland and the surrounding area. The present population of 495 is projected to increase to 725 by 2020.

Existing Systems. There are no existing sewage treatment facilities in the planning area other than individual septic tank-drain field systems. It is estimated that approximately 90 percent of the population use the septic tank system. There are some areas, however, where sewage is disposed of by direct discharge to the stream or by the use of pit privies.

BLOCK DIAGRAM
PEMBROKE
PROPOSED SEWAGE TREATMENT PLANT
DESIGN CAPACITY-0.275 M.G.D.



Douglas W. Domenech
Secretary of Natural Resources



David A. Johnson
Director

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

Division of Natural Heritage
217 Governor Street
Richmond, Virginia 23219-2010
(804) 786-7951

September 13, 2012

Becky France
DEQ-BRRO
3019 Peters Creek Road
Roanoke, VA 24019

Re: VA0088048, Pembroke WWTP

Dear Ms. France:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in our files, the Candy darter (*Etheostoma osburni*, G3/S1/NL/NL) and Hellbender (*Cryptobranchus alleganiensis*, G3G4/S2S3/NL/NL) have been historically documented in the New River. The Candy darter occurs in the New River drainage of Virginia and the Appalachian Plateaus of West Virginia (Jenkins and Burkhead, 1994). It inhabits rocky, clear, and small to large creeks in unsilted runs and riffles (Burkhead and Jenkins, 1991).

Threats to the habitat of this species include siltation and turbidity (Burkhead and Jenkins, 1991). In addition, the stocking of trout may result in predation of the Candy darter while the spawning sites may be trampled by wading trout fishermen (Burkhead and Jenkins, 1991).

The Hellbender, a large, completely aquatic salamander, prefers larger, clear, and fast-flowing streams of the Mississippi drainage (Martof, et. al, 1980). In Virginia, it is documented from the Holston, Clinch, Powell and New River drainages (Pague, 1991). The Hellbender depends on cool, flowing, well-oxygenated water, and it needs a coarse (rocky) substrate (NatureServe, 2009).

Threats to this species include habitat alteration from impoundments or channelization, and water pollution (Pague, 1991). In agricultural areas, siltation may bury the rocky substrates it requires (NatureServe, 2009). In addition, Hellbenders do not tolerate human recreational use of their habitat (NatureServe, 2009).

DCR supports the use of UV disinfection at this facility to improve water quality.

This project is situated on karst-forming carbonate rock and can be characterized by sinkholes, caves, disappearing streams, and large springs. If such features are encountered during the project, please coordinate with Wil Orndorff (540-553-1235, Wil.Orndorff@dcv.virginia.gov) to document and minimize adverse impacts. Discharge of runoff to sinkholes or sinking streams, filling of sinkholes, and alteration of cave entrances can lead to surface collapse, flooding, erosion and sedimentation, groundwater contamination, and degradation of subterranean habitat for natural heritage resources. If the project involves filling or "improvement" of sinkholes or cave openings, DCR would like detailed location information and copies of the design specifications. In cases where sinkhole improvement is for stormwater discharge, copies of VDOT Form EQ-120 will suffice.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

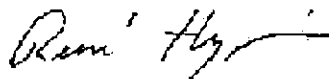
Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

The Virginia Department of Game and Inland Fisheries (VDGIF) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from <http://vafwis.org/fwis/> or contact Gladys Cason (804-367-0909 or Gladys.Cason@dgif.virginia.gov).

Should you have any questions or concerns, feel free to contact me at 804-371-2708. Thank you for the opportunity to comment on this project.

Sincerely,



S. Rene' Hypes
Project Review Coordinator

CC: Wil Orndorff, DCR-Karst

Literature Cited

Burkhead, Noel M. and Robert E. Jenkins. 1991. Candy darter. In Virginia's Endangered Species: Proceedings of a Symposium. K. Terwilliger ed. The McDonald and Woodward Publishing Company, Blacksburg, Virginia.

Jenkins, R. E., and N. M. Burkhead. 1994. Freshwater fishes of Virginia. American Fisheries Society, Bethesda, Maryland. xxiii + 1079 pp.

Martof, B.S., W.M. Palmer, J.R. Bailey, and J.R. Harrison III. 1980. Amphibians and reptiles of the Carolinas and Virginia. University of North Carolina Press. Chapel Hill, North Carolina.

NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 6, 2010).

Pague, C.A. 1991. Hellbender. In Virginia's Endangered Species: Proceedings of a Symposium. K. Terwilliger ed. The McDonald and Woodward Publishing Company. Blacksburg, Virginia.

Attachment F

Effluent Data

Effluent Temperature Data for 90th Percentile Calculation

| Days | Jul-07 | Aug-07 | Sep-07 | Oct-07 | Nov-07 | Dec-07 | Jan-08 | Feb-08 | Mar-08 | Apr-08 | May-08 | Jun-08 |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1 | 21.2 | 22.1 | 23.3 | 19.0 | 14.9 | 11.8 | 10.9 | 8.9 | 9.2 | 13.7 | 14.1 | 19.5 |
| 2 | 20.1 | 21.6 | 23.1 | 19.4 | 14.3 | 12.0 | 7.4 | 8.2 | 8.7 | 12.6 | 15.3 | 19.8 |
| 3 | 20.9 | 22.3 | 23.1 | 20.2 | 15.4 | 12.4 | 6.2 | 9.7 | 9.5 | 12.4 | 16.1 | 19.0 |
| 4 | 22.4 | 23.1 | 22.0 | 20.6 | 15.1 | 10.2 | 7.9 | 9.7 | 12.2 | 12.3 | 16.0 | 19.5 |
| 5 | 22.1 | 23.2 | 20.8 | 21.1 | 14.8 | 10.3 | 8.1 | 10.7 | 10.6 | 13.1 | 15.3 | 20.1 |
| 6 | 22.4 | 23.2 | 22.2 | 21.4 | 13.7 | 8.7 | 9.4 | 11.7 | 9.8 | 12.9 | 15.2 | 21.0 |
| 7 | 21.9 | 23.4 | 22.4 | 21.4 | 13.7 | 9.4 | 9.8 | 10.4 | 11.1 | 12.5 | 15.3 | 21.7 |
| 8 | 22.2 | 23.6 | 22.3 | 21.2 | 12.4 | 11.0 | 10.9 | 11.3 | 11.6 | 13.1 | 17.1 | 23.3 |
| 9 | 22.2 | 23.8 | 22.6 | 21.2 | 13.7 | 13.0 | 11.9 | 11.0 | 6.6 | 12.7 | 16.4 | 21.9 |
| 10 | 23.0 | 23.3 | 23.0 | 20.8 | 14.6 | 13.5 | 11.8 | 9.8 | 9.4 | 13.7 | 17.0 | 22.7 |
| 11 | 22.9 | 23.7 | 22.8 | 19.0 | 12.2 | 14.4 | 11.9 | 7.7 | 9.0 | 13.6 | 16.9 | 22.1 |
| 12 | 22.3 | 23.7 | 22.3 | 18.2 | 13.9 | 13.3 | 10.6 | 8.8 | 9.5 | 16.0 | 15.4 | 22.1 |
| 13 | 21.8 | 22.1 | 21.3 | 16.8 | 15.5 | 14.2 | 10.9 | 9.3 | 9.8 | 14.2 | 14.6 | 22.1 |
| 14 | 21.0 | 22.2 | 22.1 | 16.5 | 15.5 | 12.9 | 9.7 | 6.5 | 9.8 | 13.4 | 15.0 | 22.3 |
| 15 | 21.3 | 21.9 | 21.8 | 17.5 | 14.9 | 11.8 | 9.7 | 7.3 | 11.7 | 12.1 | 16.7 | 22.2 |
| 16 | 22.3 | 22.4 | 19.2 | 18.1 | 12.3 | 11.4 | 8.3 | 9.4 | 11.1 | 12.5 | 17.4 | 20.9 |
| 17 | 22.3 | 23.1 | 19.6 | 19.0 | 12.3 | 9.5 | 7.2 | 10.1 | 11.2 | 12.1 | 15.9 | 21.1 |
| 18 | 22.5 | 23.0 | 19.7 | 20.2 | 12.0 | 8.1 | 8.8 | 12.5 | 10.5 | 12.6 | 16.6 | 20.0 |
| 19 | 23.2 | 22.0 | 19.9 | 20.8 | 13.9 | 10.3 | 9.3 | 10.9 | 12.7 | 14.2 | 16.1 | 19.4 |
| 20 | 23.0 | 22.8 | 20.0 | 19.5 | 15.4 | 9.4 | 9.2 | 10.8 | 11.5 | 13.0 | 15.3 | 19.2 |
| 21 | 21.8 | 22.6 | 21.3 | 18.5 | 15.2 | 10.2 | 6.9 | 9.2 | 11.5 | 13.9 | 16.5 | 19.9 |
| 22 | 21.2 | 23.1 | 21.3 | 18.0 | 15.6 | 10.5 | 7.9 | 9.6 | 11.6 | 14.7 | 16.2 | 20.8 |
| 23 | 21.1 | 23.3 | 20.3 | 19.5 | 13.9 | 11.5 | 9.2 | 11.1 | 11.0 | 15.0 | 16.1 | 20.1 |
| 24 | 21.1 | 24.0 | 21.8 | 20.3 | 14.1 | 10.0 | 8.3 | 9.6 | 10.5 | 15.3 | 16.9 | 20.0 |
| 25 | 21.0 | 23.1 | 21.0 | 19.4 | 14.6 | 10.1 | 5.9 | 9.6 | 10.2 | 15.8 | 16.6 | 20.0 |
| 26 | 21.3 | 23.5 | 22.5 | 18.4 | 13.6 | 10.3 | 7.9 | 10.6 | 10.8 | 16.0 | 17.1 | 20.4 |
| 27 | 20.9 | 23.5 | 21.7 | 18.2 | 13.6 | 10.3 | 8.7 | 9.1 | 11.6 | 16.8 | 18.4 | 21.3 |
| 28 | 21.6 | 23.6 | 21.8 | 17.2 | 12.7 | 11.2 | 8.5 | 8.6 | 12.4 | 16.6 | 19.0 | 21.0 |
| 29 | 22.0 | 23.5 | 21.6 | 15.9 | 11.5 | 11.2 | 9.4 | 7.9 | 12.4 | 14.0 | 18.5 | 21.9 |
| 30 | 22.5 | 23.8 | 18.8 | 14.2 | 11.4 | 11.3 | 8.6 | | 10.9 | 13.3 | 18.6 | 21.5 |
| 31 | 21.4 | 23.4 | | 14.9 | | 11.2 | 8.6 | | 11.0 | | 19.5 | |

Data are given as Celsius.

90th percentile 22.5 °C

90th percentile 16.6 °C (wet season - Jan - May)

Pembroke WWTP
 VPDES Permit No. VA0088048

Effluent pH (S.U.)

| Date Due | min | max |
|-----------|------|------|
| 10-Feb-08 | 6.27 | 7.04 |
| 10-Mar-08 | 6.59 | 7.1 |
| 10-Apr-08 | 6.73 | 7.41 |
| 10-May-08 | 6.61 | 7.45 |
| 10-Jun-08 | 6.86 | 7.63 |
| 10-Jul-08 | 6.84 | 7.83 |
| 10-Aug-08 | 7.29 | 7.85 |
| 10-Sep-08 | 6.85 | 7.63 |
| 10-Oct-08 | 6.63 | 7.37 |
| 10-Nov-08 | 6.39 | 7.3 |
| 10-Dec-08 | 6.28 | 7.73 |
| 10-Jan-09 | 6.35 | 7.54 |
| 10-Feb-09 | 6.94 | 7.67 |
| 10-Mar-09 | 6.82 | 7.48 |
| 10-Apr-09 | 6.7 | 7.54 |
| 10-May-09 | 7.16 | 7.8 |
| 10-Jun-09 | 7.26 | 7.75 |
| 10-Jul-09 | 7.22 | 7.72 |
| 10-Aug-09 | 7.35 | 7.85 |
| 10-Sep-09 | 7.08 | 7.92 |
| 10-Oct-09 | 7.26 | 7.82 |
| 10-Nov-09 | 6.88 | 7.59 |
| 10-Dec-09 | 6.92 | 7.58 |
| 10-Jan-10 | 6.94 | 7.89 |
| 10-Feb-10 | 6.9 | 7.43 |
| 10-Mar-10 | 7 | 7.38 |
| 10-Apr-10 | 6.98 | 7.45 |
| 10-May-10 | 6.94 | 7.46 |
| 10-Jun-10 | 6.28 | 7.83 |
| 10-Jul-10 | 7.28 | 7.72 |
| 10-Aug-10 | 7.23 | 7.73 |
| 10-Sep-10 | 7.25 | 7.87 |
| 10-Oct-10 | 7.42 | 7.84 |
| 10-Nov-10 | 7.17 | 7.95 |
| 10-Dec-10 | 6.75 | 7.53 |
| 10-Jan-11 | 6.24 | 7.35 |
| 10-Feb-11 | 6.46 | 7.11 |
| 10-Mar-11 | 6.35 | 7.29 |
| 10-Apr-11 | 6.49 | 7.13 |
| 10-May-11 | 6.56 | 7.48 |
| 10-Jun-11 | 7.29 | 7.8 |
| 10-Jul-11 | 7.53 | 8.18 |
| 10-Aug-11 | 7.34 | 7.98 |
| 10-Sep-11 | 7.33 | 7.9 |
| 10-Oct-11 | 7.35 | 7.77 |
| 10-Nov-11 | 6.36 | 7.74 |
| 10-Dec-11 | 6.39 | 7.39 |
| 10-Jan-12 | 6.04 | 7.1 |
| 10-Feb-12 | 6.3 | 7.53 |
| 10-Mar-12 | 6.02 | 6.73 |
| 10-Apr-12 | 6.22 | 6.82 |
| 10-May-12 | 6.18 | 7.08 |
| 10-Jun-12 | 6.37 | 7.07 |
| 10-Jul-12 | 6.46 | 7.36 |
| 10-Aug-12 | 6.47 | 7.19 |
| 10-Sep-12 | 6.5 | 7.2 |

90th Percentile pH 7.9 S.U.
 10th Percentile pH 6.2 S.U.

Pembroke WWTP
VPDES Permit No. VA0088048

Effluent pH (S.U.)

| Date Due | min | max |
|-----------------|------------|------------|
| 10-Oct-12 | 6.19 | 7.23 |
| 10-Nov-12 | 6.33 | 7.02 |
| 10-Dec-12 | 6.17 | 6.63 |
| 10-Jan-13 | 6.06 | 6.79 |
| 10-Feb-13 | 6.17 | 7.72 |
| 10-Mar-13 | 6.61 | 7.56 |



Pace Analytical Services, Inc.
205 East Meadow Road - Suite A
Eden, NC 27288
(336)623-8921

Pace Analytical Services, Inc.
2225 Riverside Dr.
Asheville, NC 28804
(828)254-7176

Pace Analytical Services, Inc.
9800 Kinney Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

ANALYTICAL RESULTS

Project: 5 Year Testing

Pace Project No.: 92133832

| Sample: WW 1 | | Lab ID: 92133832001 | | Collected: 10/02/12 09:00 | | Received: 10/03/12 10:00 | | Matrix: Water | |
|--|---------|---------------------|--------------|---------------------------|----|--------------------------|----------------|---------------|------|
| Parameters | Results | Units | Report Limit | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
| 608 GCS Pesticides and PCBs Analytical Method: EPA 608 Preparation Method: EPA 3535 | | | | | | | | | |
| 4,4'-DDD | ND | ug/L | 0.050 | 0.050 | 1 | 10/04/12 12:11 | 10/05/12 16:27 | 72-54-8 | |
| 4,4'-DDE | ND | ug/L | 0.050 | 0.050 | 1 | 10/04/12 12:11 | 10/05/12 16:27 | 72-55-9 | |
| 4,4'-DDT | ND | ug/L | 0.050 | 0.050 | 1 | 10/04/12 12:11 | 10/05/12 16:27 | 50-29-3 | |
| Heptachlor epoxide | ND | ug/L | 0.050 | 0.050 | 1 | 10/04/12 12:11 | 10/05/12 16:27 | 1024-57-3 | |
| Surrogates | | | | | | | | | |
| Tetrachloro-m-xylene (S) | 45 % | | 20-110 | | 1 | 10/04/12 12:11 | 10/05/12 16:27 | 877-09-8 | |
| Decachlorobiphenyl (S) | 153 % | | 20-138 | | 1 | 10/04/12 12:11 | 10/05/12 16:27 | 2051-24-3 | S5 |

| Sample: WW 3 | | Lab ID: 92133832002 | | Collected: 10/02/12 09:04 | | Received: 10/03/12 10:00 | | Matrix: Water | |
|--|---------|---------------------|--------------|---------------------------|----|--------------------------|----------------|---------------|------|
| Parameters | Results | Units | Report Limit | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
| 8270 MSSV Semivolatile Organic Analytical Method: EPA 8270 Preparation Method: EPA 3510 | | | | | | | | | |
| Benzidine | ND | ug/L | 50.0 | 5.1 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 92-87-5 | |
| bis(2-Chloroethyl) ether | ND | ug/L | 10.0 | 1.0 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 111-44-4 | |
| bis(2-Chloroisopropyl) ether | ND | ug/L | 10.0 | 0.95 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 108-60-1 | |
| 2-Chloronaphthalene | ND | ug/L | 10.0 | 0.98 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 91-58-7 | |
| 3,3'-Dichlorobenzidine | ND | ug/L | 20.0 | 2.1 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 91-94-1 | |
| Dimethylphthalate | ND | ug/L | 10.0 | 0.76 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 131-11-3 | |
| 4,6-Dinitro-2-methylphenol | ND | ug/L | 20.0 | 2.6 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 534-52-1 | |
| 2,4-Dinitrophenol | ND | ug/L | 50.0 | 9.0 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 51-28-5 | |
| 2,4-Dinitrotoluene | ND | ug/L | 10.0 | 0.90 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 121-14-2 | |
| 1,2-Diphenylhydrazine | ND | ug/L | 10.0 | 0.90 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 122-66-7 | |
| Hexachloro-1,3-butadiene | ND | ug/L | 10.0 | 0.94 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 87-68-3 | |
| Hexachlorocyclopentadiene | ND | ug/L | 10.0 | 0.88 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 77-47-4 | |
| Hexachloroethane | ND | ug/L | 10.0 | 1.1 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 67-72-1 | |
| Indeno(1,2,3-cd)pyrene | ND | ug/L | 10.0 | 0.29 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 193-39-5 | |
| Kepone | ND | ug/L | 10.0 | 8.3 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 143-50-0 | |
| N-Nitrosodimethylamine | ND | ug/L | 10.0 | 0.91 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 62-75-9 | |
| N-Nitrosodiphenylamine | ND | ug/L | 10.0 | 1.0 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 86-30-6 | |
| Parathion (Ethyl parathion) | ND | ug/L | 10.0 | 5.1 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 56-38-2 | |
| 1,2,4-Trichlorobenzene | ND | ug/L | 10.0 | 0.98 | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 120-82-1 | |
| Surrogates | | | | | | | | | |
| Nitrobenzene-d5 (S) | 39 % | | 21-110 | | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 4165-60-0 | |
| 2-Fluorobiphenyl (S) | 36 % | | 27-110 | | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 321-60-8 | |
| Terphenyl-d14 (S) | 77 % | | 31-107 | | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 1718-51-0 | |
| Phenol-d6 (S) | 11 % | | 10-110 | | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 13127-88-3 | |
| 2-Fluorophenol (S) | 19 % | | 12-110 | | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 367-12-4 | |
| 2,4,6-Tribromophenol (S) | 56 % | | 27-110 | | 1 | 10/09/12 15:00 | 10/10/12 15:25 | 118-79-6 | |

Date: 03/04/2013 11:47 AM

REPORT OF LABORATORY ANALYSIS

Page 5 of 15

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ANALYTICAL RESULTS

Project: 5 Year Testing

Pace Project No.: 92133832

| Sample: WW 4 | | Lab ID: 92133832003 | | Collected: 10/02/12 09:06 | | Received: 10/03/12 10:00 | | Matrix: Water | |
|---------------------------------------|---------|----------------------------|--------------|---------------------------|----|--------------------------|----------------|---------------|------|
| Parameters | Results | Units | Report Limit | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
| 7196 Chromium, Hexavalent Diss | | | | | | | | | |
| Analytical Method: EPA 7196 | | | | | | | | | |
| Chromium, Hexavalent, Dissolved | ND | mg/L | 0.050 | 0.050 | 1 | | 10/04/12 22:27 | 18540-29-9 | H3 |

| Sample: WW 5 | | Lab ID: 92133832004 | | Collected: 10/02/12 09:08 | | Received: 10/03/12 10:00 | | Matrix: Water | |
|--|---------|----------------------------|--------------|---------------------------|----|--------------------------|----------------|---------------|------|
| Parameters | Results | Units | Report Limit | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
| 6010 MET ICP, Dissolved | | | | | | | | | |
| Analytical Method: EPA 6010 Preparation Method: EPA 3010 | | | | | | | | | |
| Chromium, Dissolved | ND | ug/L | 5.0 | 0.40 | 1 | 10/06/12 18:15 | 10/09/12 01:33 | 7440-47-3 | |
| Thallium, Dissolved | ND | ug/L | 10.0 | 3.0 | 1 | 10/06/12 18:15 | 10/09/12 01:33 | 7440-28-0 | |

| Sample: WW 6 | | Lab ID: 92133832005 | | Collected: 10/02/12 09:10 | | Received: 10/03/12 10:00 | | Matrix: Water | |
|------------------------------|---------|----------------------------|--------------|---------------------------|----|--------------------------|----------------|---------------|------|
| Parameters | Results | Units | Report Limit | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
| 624 Volatile Organics | | | | | | | | | |
| Analytical Method: EPA 624 | | | | | | | | | |
| Acrolein | ND | ug/L | 100 | 8.8 | 1 | | 10/06/12 06:36 | 107-02-8 | |
| Acrylonitrile | ND | ug/L | 100 | 11.5 | 1 | | 10/06/12 06:36 | 107-13-1 | |
| Bromomethane | ND | ug/L | 10.0 | 2.5 | 1 | | 10/06/12 06:36 | 74-83-9 | |
| trans-1,2-Dichloroethene | ND | ug/L | 5.0 | 1.8 | 1 | | 10/06/12 06:36 | 156-60-5 | |
| 1,2-Dichloropropane | ND | ug/L | 5.0 | 1.7 | 1 | | 10/06/12 06:36 | 78-87-5 | |
| cis-1,3-Dichloropropene | ND | ug/L | 5.0 | 1.6 | 1 | | 10/06/12 06:36 | 10061-01-5 | |
| trans-1,3-Dichloropropene | ND | ug/L | 5.0 | 1.6 | 1 | | 10/06/12 06:36 | 10061-02-6 | |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 5.0 | 1.5 | 1 | | 10/06/12 06:36 | 79-34-5 | |
| 1,1,2-Trichloroethane | ND | ug/L | 5.0 | 1.7 | 1 | | 10/06/12 06:36 | 79-00-5 | |
| Surrogates | | | | | | | | | |
| Dibromofluoromethane (S) | 103 % | | 70-130 | | 1 | | 10/06/12 06:36 | 1868-53-7 | |
| 4-Bromofluorobenzene (S) | 94 % | | 70-130 | | 1 | | 10/06/12 06:36 | 460-00-4 | |
| Toluene-d8 (S) | 97 % | | 70-130 | | 1 | | 10/06/12 06:36 | 2037-26-5 | |
| 1,2-Dichloroethane-d4 (S) | 123 % | | 70-130 | | 1 | | 10/06/12 06:36 | 17060-07-0 | |



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QUALIFIERS

Project: 5 Year Testing
Pace Project No.: 92133832

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Acid preservation may not be appropriate for 2-Chloroethylvinyl ether, Styrene, and Vinyl chloride.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-A Pace Analytical Services - Asheville
PASI-C Pace Analytical Services - Charlotte

ANALYTE QUALIFIERS

H3 Sample was received or analysis requested beyond the recognized method holding time.
L2 Analyte recovery in the laboratory control sample (LCS) was below QC limits. Results for this analyte in associated samples may be biased low.
M0 Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
M3 Matrix spike recovery was outside laboratory control limits due to matrix interferences.
R1 RPD value was outside control limits.
S3 Surrogate recovery exceeded laboratory control limits. Analyte presence below reporting limits in associated samples. Results unaffected by high bias.
S5 Surrogate recovery outside control limits due to matrix interferences (not confirmed by re-analysis).

ANALYTICAL DATA REPORT

UL ORDER ID **1210089**

UL Sample Number **1210089-001**

Sample Site: **WW2 92133832006**

Grab Date/Time: **10/2/2012 09:02:00**

Client Sample ID: **WW2 92133832006**

Composite Start: **N/A**

Sample Matrix: **Wastewater**

Composite Stop: **N/A**

Collected By: **CLIENT**

| Parameter | Test Result | Units | RL | Analysis Date/Time | Location | Comment |
|-----------------|-------------|-------|------|---------------------|----------|---------|
| <hr/> | | | | | | |
| GC/FPD | | | | | | |
| TBT Tributyltin | <0.03 | ug/L | 0.03 | 10/12/2012 14:43:00 | HAM | |

Comments for 1210089-001

No comments

ANALYTICAL DATA REPORT

UL ORDER ID **1210089**

Analytical Methods Reference

VDEH Lab# 00030 (Hampton) VDEH Lab# 00065 (Fredericksburg) NCWW Lab # 543 (Hampton)
NCDW Lab # 51706 (Hampton) VELAP ID 460036 (Hampton) VELAP ID 460164 (Fredericksburg)

Description: **Prep Method:** **Method** **Reference** accredited/status

Wastewater

TBT Tributyltin liq/liq GC/FPD Accredited

NOTE: Analysis is performed according to Universal Laboratories Standard Operating Procedures which are based on the analytical methods referenced above

GLOSSARY OF TERMS AND ABBREVIATIONS

RL (Reporting Limit): The minimum levels, concentrations, or quantities of target analyte that can be reported with a specified degree of confidence. Generally this number is near or equal to the lowest calibration standard run with the analytical batch.

MDL (Method Detection Limit): The constituent concentration that, when processed through the complete method, produces a signal with a 99% probability that it is different from the blank.

LCS (Laboratory Control Sample): is a sample matrix free from the analytes of interest, spiked with verified amounts of analytes.

MS (Matrix Spike): a sample prepared by adding a known mass of target analyte to a specific amount of sample for which an independent estimate of target analyte concentration is available.

MSD (Matrix Spike Duplicate): is a replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision recovery for each analyte.

Surrogate is a substance with properties that mimic the analyte of interest. It is unlikely to be found in environmental samples and is added to them for quality control purposes.

IS (Internal Standard): is a known amount of standard added to a test portion of the sample as a reference for evaluation and controlling the precision and bias of the applied analytical method.

RPD (Relative Percent Difference) is the difference between a set of sample duplicates or sample spike duplicates.

ICV (Initial Calibration Verification) CCV (Continuing Calibration Verification) FCV (Final Calibration Verification)

Method Blank is a sample matrix similar to the batch of associated samples that is free from analytes of interest and is processed simultaneously with and under the same conditions as samples.

Trip Blank is a sample of analyte free media collected in the same type of container that is required for the analytical test, taken from the laboratory to the sampling site and returned to the laboratory unopened. A trip blank is used to document contamination attributable to shipping and field handling procedures.

Holding Time is the maximum times that samples may be held prior to analysis and still be considered valid or not compromised.

ug/L=ppb ug/kg=ppb mg/kg=ppm mg/L=ppm

HAM= Analyzed in Hampton Lab

FRED= Analyzed in Fredericksburg Lab

| QC Flag | Description |
|---------|--|
| B | Analyte found in method blank |
| H | Holding time exceeded |
| L | LCS outside acceptable limits |
| V | ICV/CCV/FCV outside acceptable limits |
| D | RPD outside acceptable limits |
| MS | Matrix spike recovery outside acceptable limits |
| J | Result above calibration curve approximate value |
| QC | Method QC Criteria not met |
| MI | Matrix Interference |
| S | Surrogate outside acceptable limits |
| IS | Internal standard outside acceptable limits |

REI Consultants, Inc.
Analytical Results

Date: 25-Jun-08

CLIENT: TOWN OF PEMBROKE
Client Sample ID: 001 GRAB
Project: ATTACHEMENT A
Site ID: VA 0088048

WorkOrder: 0704252
Lab ID: 0704252-01A
Collection Date: 4/4/2007 10:00:00 AM
Matrix: WASTE WATER

| Analyses | Result | Units | Qual | PQL | MCL | Prep Date | Date Analyzed |
|---------------------------------------|--------|-------|----------------|--------|-----|---------------------|-------------------|
| DISSOLVED METALS BY ICP-MS | | | E200.8 | | | Analyst: DBB | |
| Antimony | ND | mg/L | | 0.0010 | NA | 04/09/07 12:00 AM | 04/10/07 11:35 AM |
| SEMIVOLATILE ORGANIC COMPOUNDS | | | E625 | | | Analyst: CLS | |
| Acenaphthene | ND | mg/L | | 0.0104 | NA | 04/11/07 11:02 AM | 04/12/07 8:06 PM |
| Butyl benzyl phthalate | ND | mg/L | | 0.0104 | NA | 04/11/07 11:02 AM | 04/12/07 8:06 PM |
| 2-Chlorophenol | ND | mg/L | | 0.0104 | NA | 04/11/07 11:02 AM | 04/12/07 8:06 PM |
| Di-n-butyl phthalate | ND | mg/L | | 0.0104 | NA | 04/11/07 11:02 AM | 04/12/07 8:06 PM |
| 2,4-Dichlorophenol | ND | mg/L | | 0.0104 | NA | 04/11/07 11:02 AM | 04/12/07 8:06 PM |
| Diethyl phthalate | ND | mg/L | | 0.0104 | NA | 04/11/07 11:02 AM | 04/12/07 8:06 PM |
| 2,4-Dimethylphenol | ND | mg/L | | 0.0104 | NA | 04/11/07 11:02 AM | 04/12/07 8:06 PM |
| Fluorene | ND | mg/L | | 0.0104 | NA | 04/11/07 11:02 AM | 04/12/07 8:06 PM |
| Nitrobenzene | ND | mg/L | | 0.0104 | NA | 04/11/07 11:02 AM | 04/12/07 8:06 PM |
| 1,2,4-Trichlorobenzene | ND | mg/L | | 0.0104 | NA | 04/11/07 11:02 AM | 04/12/07 8:06 PM |
| VOLATILE ORGANIC COMPOUNDS | | | SW8021B | | | Analyst: M | |
| m,p-Xylene | ND | µg/L | | 2.00 | NA | | 04/09/07 4:55 PM |
| o-Xylene | ND | µg/L | | 1.00 | NA | | 04/09/07 4:55 PM |
| VOLATILE ORGANIC COMPOUNDS | | | E624 | | | Analyst: AS | |
| 1,1-Dichloroethene | ND | µg/L | | 5.0 | NA | | 04/09/07 11:37 AM |
| HYDROGEN SULFIDE | | | E376.1 | | | Analyst: LK | |
| Hydrogen Sulfide | 1.40 | mg/L | | 1.00 | NA | | 04/06/07 3:00 PM |

Key: MCL Maximum Contaminant Level Qualifiers: B Analyte detected in the associated Method Blank

MDL Minimum Detection Limit

NA Not Applicable

ND Not Detected at the PQL or MDL

PQL Practical Quantitation Limit

TIC Tentatively Identified Compound, Estimated Concentration

E Estimated Value above quantitation range

H Holding times for preparation or analysis exceeded

S Spike/Surrogate Recovery outside accepted recovery limits

* Value exceeds Maximum Contaminant Level

Page 2 of 3

REI Consultants, Inc.**Analytical Results**

Date: 25-Jun-08

CLIENT: TOWN OF PEMBROKE**Client Sample ID:** 001 COMP**Project:** ATTACHEMENT A**Site ID:** VA 0088048**WorkOrder:** 0704252**Lab ID:** 0704252-02A**Collection Date:** 4/4/2007 10:00:00 AM**Matrix:** WASTE WATER

| Analyses | Result | Units | Qual | PQL | MCL | Prep Date | Date Analyzed |
|----------------------------|--------|-------|-----------------|------|-----|-------------------|-------------------|
| HARDNESS | | | SM2340 B | | | Analyst: JD | |
| Hardness, Total (As CaCO3) | 53.8 | mg/L | | 1.00 | NA | 04/09/07 12:00 AM | 04/09/07 10:27 PM |

Key: MCL Maximum Contaminant Level Qualifiers: B Analyte detected in the associated Method Blank

MDL Minimum Detection Limit

NA Not Applicable

ND... Not Detected at the PQL or MDL

PQL Practical Quantitation Limit

TIC Tentatively Identified Compound, Estimated Concentration

E Estimated Value above quantitation range

H Holding times for preparation or analysis exceeded

S Spike/Surrogate Recovery outside accepted recovery limits

* Value exceeds Maximum Contaminant Level

Page 3 of 3

OLVER LABORATORIES

Client Sheet No.

Client

Date

14806

Town of Pembroke

September 6, 2002

DEQ - WORO

SEP 10 2002

Sample No.:

149872

Date Collected:

8/21/02

Time Collected:

9:30 a.m.

Description:

Effluent Wastewater
Grab

RECEIVED

| <u>Analysis</u> | <u>Result</u> | <u>QL</u> | <u>SSTV</u> | <u>Date/Time Analyzed</u> | <u>Analysts' Initials</u> |
|------------------------------------|---------------|-----------|-------------|---------------------------|---------------------------|
| Total Cyanide (EPA 335.2) | BQL | 100 µg/L | N/A | 8/22/02; 0800 | SBH |
| Dissolved Hexavalent (SM 3500Cr,D) | BQL | 50 µg/L | 384 µg/L | 8/21/02; 1130 | NA |
| Total Arsenic (EPA 200.9) | BQL | 10 µg/L | 50 µg/L | 8/26/02; 1820 | TSS |
| Total Barium (EPA 200.7) | BQL | 20 µg/L | N/A | 8/28/02; 1045 | SC |
| Total Cadmium (EPA 200.9) | BQL | 1 µg/L | 65 µg/L | 8/28/02; 0830 | TSS |
| Total Copper (EPA 200.9) | 12 µg/L | 10 µg/L | 312 µg/L | 8/28/02; 1720 | TSS |
| Total Lead (EPA 200.9) | BQL | 10 µg/L | 1,884 µg/L | 8/26/02; 1400 | TSS |
| Total Mercury (EPA 245.1) | BQL | 0.2 µg/L | 16 µg/L | 8/26/02; 1200 | SAH |
| Total Nickel (EPA 200.9) | BQL | 10 µg/L | 3,327 µg/L | 8/26/02; 1900 | TSS |
| Total Selenium (EPA 200.9) | BQL | 10 µg/L | 480 µg/L | 8/26/02; 2200 | TSS |
| Total Silver (EPA 200.9) | BQL | 2 µg/L | 55 µg/L | 8/28/02; 1315 | TSS |
| Total Zinc (EPA 200.7) | 89 µg/L | 50 µg/L | 2,130 µg/L | 8/28/02; 1045 | SC |

SSTV = Site-Specific Target Value

BQL = Below Quantitation Limit

N/A = Not Applicable

OLVER LABORATORIES

Client Sheet No. 14806
Client Town of Pembroke
Date September 6, 2002

Sample No.: 149873
Date Collected: 8/20/02
Time Collected: 8:00 a.m.
Description: Effluent Wastewater
Grab

DEQ - WQRO

AT 10 0002

RECEIVED

| <u>Analysis</u> | <u>Result</u> | <u>QL</u> | <u>Date/Time Analyzed</u> | <u>Analyst Initials</u> |
|----------------------------|---------------|-----------|---------------------------|-------------------------|
| Pesticides/PCBs (EPA 608): | | | 8/29/02; 0855 | DF |
| Aldrin | BQL | 0.05 µg/L | | |
| Chlordane | BQL | 0.2 µg/L | | |
| DDT | BQL | 0.1 µg/L | | |
| Dieldrin | BQL | 0.1 µg/L | | |
| Endosulfan I | BQL | 0.1 µg/L | | |
| Endosulfan II | BQL | 0.1 µg/L | | |
| Endosulfan Sulfate | BQL | 0.1 µg/L | | |
| Endrin | BQL | 0.1 µg/L | | |
| Heptachlor | BQL | 0.05 µg/L | | |
| Hexachlorocyclohexane | BQL | 0.05 µg/L | | |
| Methoxychlor | BQL | 10 µg/L | | |
| Mirex | BQL | 0.1 µg/L | | |
| Toxaphene | BQL | 5.0 µg/L | | |
| PCB-1242 | BQL | 1.0 µg/L | | |
| PCB-1254 | BQL | 1.0 µg/L | | |
| PCB-1221 | BQL | 1.0 µg/L | | |
| PCB-1232 | BQL | 1.0 µg/L | | |
| PCB-1248 | BQL | 1.0 µg/L | | |
| PCB-1260 | BQL | 1.0 µg/L | | |
| PCB-1016 | BQL | 1.0 µg/L | | |

OLVER LABORATORIES

Client Sheet No.
Client
Date

14806
Town of Pembroke
September 6, 2002

Sample No.: 149873

Date Collected: 8/20/02

Time Collected: 8:00 a.m.

Description: Effluent Wastewater
Grab

DED - WCB

OUT 10 00Z

RECEIVED

| <u>Analysis</u> | <u>Result</u> | <u>QL</u> | <u>Date/Time Analyzed</u> | <u>Analyst Initials</u> |
|---|---------------|-----------|---------------------------|-------------------------|
| Pesticides (EPA 622): | | | 8/29/02; 0855 | PMW |
| Chlorpyrifos (Dursban) | BQL | 0.2 µg/L | | |
| Demeton | BQL | 0.2 µg/L | | |
| Guthion | BQL | 0.2 µg/L | | |
| Malathion | BQL | 0.2 µg/L | | |
| Parathion | BQL | 0.2 µg/L | | |
| Herbicides (SW-846 8151A): | | | 8/30/02; 1526 | DF |
| 2,4,5-Trichlorophenoxypropionic acid (Silvex) | BQL | 0.2 µg/L | | |
| 2,4-Dichlorophenoxy (2,4-D) | BQL | 0.2 µg/L | | |
| Base/Neutral Extractable Organic Compounds (EPA 625): | | | 8/20/02; 2149 | PMW |
| Anthracene | BQL | 10 µg/L | | |
| Benzo(a)anthracene | BQL | 10 µg/L | | |
| Benzo(b)fluoranthene | BQL | 10 µg/L | | |
| Benzo(k)fluoranthene | BQL | 10 µg/L | | |
| Benzo(a)pyrene | BQL | 10 µg/L | | |
| Chrysene | BQL | 10 µg/L | | |
| Dibenz(a,h)anthracene | BQL | 20 µg/L | | |
| 1,2-Dichlorobenzene | BQL | 10 µg/L | | |
| 1,3-Dichlorobenzene | BQL | 10 µg/L | | |
| 1,4-Dichlorobenzene | BQL | 10 µg/L | | |
| 2,4-Dinitrotoluene | BQL | 10 µg/L | | |
| Di-2-ethylhexylphthalate | BQL | 10 µg/L | | |
| Fluoranthene | BQL | 10 µg/L | | |
| Indeno (1,2,3-cd) Pyrene | BQL | 20 µg/L | | |
| Isophorone | BQL | 10 µg/L | | |
| Naphthalene | BQL | 10 µg/L | | |
| Pyrene | BQL | 10 µg/L | | |

OLVER LABORATORIES

ER
TORIES

Client Sheet No. 14806
Client Town of Pembroke
Date September 6, 2002

DEQ - WCRD

OUT 1 - 202

Sample No.: 149873

Date Collected: 8/20/02

RECEIVED

Time Collected: 8:00 a.m.

Description: Effluent Wastewater
Grab

| <u>Analysis</u> | <u>Result</u> | <u>QL</u> | <u>Date/Time Analyzed</u> | <u>Analyst Initials</u> |
|--|---------------|-----------|---------------------------|-------------------------|
| Acid Extractables Organic Compounds (EPA 625): | | | 8/28/02; 2149 | PMW |
| Pentachlorophenol | BQL | 50 µg/L | | |
| Phenol | BQL | 10 µg/L | | |
| 2,4,6-Trichlorophenol | BQL | 10 µg/L | | |
| Volatile Organic Compounds (EPA 624): | | | 8/23/02; 0615 | BP |
| Benzene | BQL | 10 µg/L | | |
| Bromoform | BQL | 10 µg/L | | |
| Carbon Tetrachloride | BQL | 10 µg/L | | |
| Chlorodibromomethane | BQL | 10 µg/L | | |
| Chloroform | BQL | 10 µg/L | | |
| Chloromethane | BQL | 20 µg/L | | |
| Dichloromethane | BQL | 10 µg/L | | |
| Dichlorobromomethane | BQL | 20 µg/L | | |
| 1,2-Dichloroethane | BQL | 10 µg/L | | |
| Ethylbenzene | BQL | 10 µg/L | | |
| Monochlorobenzene | BQL | 50 µg/L | | |
| Tetrachloroethylene | BQL | 10 µg/L | | |
| Toluene | BQL | 10 µg/L | | |
| Trichloroethylene | BQL | 10 µg/L | | |
| Vinyl chloride | BQL | 10 µg/L | | |

Client Sheet No.
Client
Date

14806
Town of Pembroke
September 6, 2002

Sample No.: 149874
Date Collected: 8/20/02
Time Collected: 4:00 p.m.
Description: Effluent Wastewater
Grab

DEQ - WICPO

OCT 14 2002

RECEIVED

| <u>Analysis</u> | <u>Result</u> | <u>QL</u> | <u>Date/Time Analyzed</u> | <u>Analyst Initials</u> |
|----------------------------|---------------|-----------|---------------------------|-------------------------|
| Pesticides/PCBs (EPA 608): | | | 8/29/02; 1029 | PMW |
| Aldrin | BQL | 0.05 µg/L | | |
| Chlordane | BQL | 0.2 µg/L | | |
| DDT | BQL | 0.1 µg/L | | |
| Dieldrin | BQL | 0.1 µg/L | | |
| Endosulfan I | BQL | 0.1 µg/L | | |
| Endosulfan II | BQL | 0.1 µg/L | | |
| Endosulfan Sulfate | BQL | 0.1 µg/L | | |
| Endrin | BQL | 0.1 µg/L | | |
| Heptachlor | BQL | 0.05 µg/L | | |
| Hexachlorocyclohexane | BQL | 0.05 µg/L | | |
| Methoxychlor | BQL | 10 µg/L | | |
| Mirex | BQL | 0.1 µg/L | | |
| Toxaphene | BQL | 5.0 µg/L | | |
| PCB-1242 | BQL | 1.0 µg/L | | |
| PCB-1254 | BQL | 1.0 µg/L | | |
| PCB-1221 | BQL | 1.0 µg/L | | |
| PCB-1232 | BQL | 1.0 µg/L | | |
| PCB-1248 | BQL | 1.0 µg/L | | |
| PCB-1260 | BQL | 1.0 µg/L | | |
| PCB-1016 | BQL | 1.0 µg/L | | |

OLVER LABORATORIES

Client Sheet No. 14806
Client Town of Pembroke
Date September 6, 2002

Sample No.: 149874

Date Collected: 8/20/02

Time Collected: 4:00 p.m.

Description: Effluent Wastewater
Grab

DEQ - WCPD

001 16 002

RECEIVED

| <u>Analysis</u> | <u>Result</u> | <u>QL</u> | <u>Date/Time Analyzed</u> | <u>Analyst Initials</u> |
|---|---------------|-----------|---------------------------|-------------------------|
| Pesticides (EPA 622): | | | 8/29/02; 0926 | DF |
| Chlorpyrifos (Dursban) | BQL | 0.2 µg/L | | |
| Demeton | BQL | 0.2 µg/L | | |
| Guthion | BQL | 0.2 µg/L | | |
| Malathion | BQL | 0.2 µg/L | | |
| Parathion | BQL | 0.2 µg/L | | |
| Herbicides (SW-846 8151A): | | | 8/30/02; 1542 | DF |
| 2,4,5-Trichlorophenoxypropionic acid (Silvex) | BQL | 0.2 µg/L | | |
| 2,4-Dichlorophenoxy (2,4-D) | BQL | 0.2 µg/L | | |
| Base/Neutral Extractable Organic Compounds (EPA 625): | | | 8/28/02; 1029 | PMW |
| Anthracene | BQL | 10 µg/L | | |
| Benzo(a)anthracene | BQL | 10 µg/L | | |
| Benzo(b)fluoranthene | BQL | 10 µg/L | | |
| Benzo(k)fluoranthene | BQL | 10 µg/L | | |
| Benzo(a)pyrene | BQL | 10 µg/L | | |
| Chrysene | BQL | 10 µg/L | | |
| Dibenz(a,h)anthracene | BQL | 20 µg/L | | |
| 1,2-Dichlorobenzene | BQL | 10 µg/L | | |
| 1,3-Dichlorobenzene | BQL | 10 µg/L | | |
| 1,4-Dichlorobenzene | BQL | 10 µg/L | | |
| 2,4-Dinitrotoluene | BQL | 10 µg/L | | |
| Di-2-ethylhexylphthalate | BQL | 10 µg/L | | |
| Fluoranthene | BQL | 10 µg/L | | |
| Indeno (1,2,3-cd) Pyrene | BQL | 20 µg/L | | |
| Isophorone | BQL | 10 µg/L | | |
| Naphthalene | BQL | 10 µg/L | | |
| Pyrene | BQL | 10 µg/L | | |

OLVER LABORATORIES

Client Sheet No. 14806
Client Town of Pembroke
Date September 6, 2002

Sample No.: 149874
Date Collected: 8/20/02
Time Collected: 4:00 p.m.
Description: Effluent Wastewater
Grab

DEQ - WCTD

COG 11 9 50/02

RECEIVED

| <u>Analysis</u> | <u>Result</u> | <u>QL</u> | <u>Date/Time Analyzed</u> | <u>Analyst Initials</u> |
|--|---------------|-----------|---------------------------|-------------------------|
| Acid Extractables Organic Compounds (EPA 625): | | | 8/28/02; 1029 | PMW |
| Pentachlorophenol | BQL | 50 µg/L | | |
| Phenol | BQL | 10 µg/L | | |
| 2,4,6-Trichlorophenol | BQL | 10 µg/L | | |
| Volatile Organic Compounds (EPA 624): | | | 8/23/02; 0644 | BP |
| Benzene | BQL | 10 µg/L | | |
| Bromoform | BQL | 10 µg/L | | |
| Carbon Tetrachloride | BQL | 10 µg/L | | |
| Chlorodibromomethane | BQL | 10 µg/L | | |
| Chloroform | BQL | 10 µg/L | | |
| Chloromethane | BQL | 20 µg/L | | |
| Dichloromethane | BQL | 10 µg/L | | |
| Dichlorobromomethane | BQL | 20 µg/L | | |
| 1,2-Dichloroethane | BQL | 10 µg/L | | |
| Ethylbenzene | BQL | 10 µg/L | | |
| Monochlorobenzene | BQL | 50 µg/L | | |
| Tetrachloroethylene | BQL | 10 µg/L | | |
| Toluene | BQL | 10 µg/L | | |
| Trichloroethylene | BQL | 10 µg/L | | |
| Vinyl chloride | BQL | 10 µg/L | | |

OLVER
LABORATORIES

Client Sheet No. 14806
Client Town of Pembroke
Date September 6, 2002

DEG. W0740

OCT 10 2002

RECEIVED

Sample No.: 149875
Date Collected: 8/21/02
Time Collected: 12:00 a.m.
Description: Effluent Wastewater
Grab

| <u>Analysis</u> | <u>Result</u> | <u>QL</u> | <u>Date/Time Analyzed</u> | <u>Analyst Initials</u> |
|----------------------------|---------------|-----------|---------------------------|-------------------------|
| Pesticides/PCBs (EPA 608): | | | 8/29/02; 0956 | DF |
| Aldrin | BQL | 0.05 µg/L | | |
| Chlordane | BQL | 0.2 µg/L | | |
| DDT | BQL | 0.1 µg/L | | |
| Dieldrin | BQL | 0.1 µg/L | | |
| Endosulfan I | BQL | 0.1 µg/L | | |
| Endosulfan II | BQL | 0.1 µg/L | | |
| Endosulfan Sulfate | BQL | 0.1 µg/L | | |
| Endrin | BQL | 0.1 µg/L | | |
| Heptachlor | BQL | 0.05 µg/L | | |
| Hexachlorocyclohexane | BQL | 0.05 µg/L | | |
| Methoxychlor | BQL | 10 µg/L | | |
| Mirex | BQL | 0.1 µg/L | | |
| Toxaphene | BQL | 5.0 µg/L | | |
| PCB-1242 | BQL | 1.0 µg/L | | |
| PCB-1254 | BQL | 1.0 µg/L | | |
| PCB-1221 | BQL | 1.0 µg/L | | |
| PCB-1232 | BQL | 1.0 µg/L | | |
| PCB-1248 | BQL | 1.0 µg/L | | |
| PCB-1260 | BQL | 1.0 µg/L | | |
| PCB-1016 | BQL | 1.0 µg/L | | |

Client Sheet No. 14806
Client Town of Pembroke
Date September 6, 2002

DEQ WORK

Sample No.: 149875
Date Collected: 8/21/02
Time Collected: 12:00 a.m.

CGT 10 2002

RECEIVED

Description: Effluent Wastewater
Grab

| <u>Analysis</u> | <u>Result</u> | <u>QL</u> | <u>Date/Time Analyzed</u> | <u>Analyst Initials</u> |
|---|---------------|-----------|---------------------------|-------------------------|
| Pesticides (EPA 622): | | | 8/29/02; 0956 | PMW |
| Chlorpyrifos (Dursban) | BQL | 0.2 µg/L | | |
| Demeton | BQL | 0.2 µg/L | | |
| Guthion | BQL | 0.2 µg/L | | |
| Malathion | BQL | 0.2 µg/L | | |
| Parathion | BQL | 0.2 µg/L | | |
| Herbicides (SW-846 8151A): | | | 8/30/02; 1557 | DF |
| 2,4,5-Trichlorophenoxypropionic acid (Silvex) | BQL | 0.2 µg/L | | |
| 2,4-Dichlorophenoxy (2,4-D) | BQL | 0.2 µg/L | | |
| Base/Neutral Extractable Organic Compounds (EPA 625): | | | 8/29/02; 0112 | PMW |
| Anthracene | BQL | 10 µg/L | | |
| Benzo(a)anthracene | BQL | 10 µg/L | | |
| Benzo(b)fluoranthene | BQL | 10 µg/L | | |
| Benzo(k)fluoranthene | BQL | 10 µg/L | | |
| Benzo(a)pyrene | BQL | 10 µg/L | | |
| Chrysene | BQL | 10 µg/L | | |
| Dibenz(a,h)anthracene | BQL | 20 µg/L | | |
| 1,2-Dichlorobenzene | BQL | 10 µg/L | | |
| 1,3-Dichlorobenzene | BQL | 10 µg/L | | |
| 1,4-Dichlorobenzene | BQL | 10 µg/L | | |
| 2,4-Dinitrotoluene | BQL | 10 µg/L | | |
| Di-2-ethylhexylphthalate | BQL | 10 µg/L | | |
| Fluoranthene | BQL | 10 µg/L | | |
| Indeno (1,2,3-cd) Pyrene | BQL | 20 µg/L | | |
| Isophorone | BQL | 10 µg/L | | |
| Naphthalene | BQL | 10 µg/L | | |
| Pyrene | BQL | 10 µg/L | | |

Client Sheet No. 14806
Client Town of Pembroke
Date September 6, 2002

Sample No.: 149875
Date Collected: 8/21/02
Time Collected: 12:00 a.m.
Description: Effluent Wastewater
Grab

DEQ - WCBQ

001 10 002

RECEIVED

| <u>Analysis</u> | <u>Result</u> | <u>QL</u> | <u>Date/Time Analyzed</u> | <u>Analyst Initials</u> |
|--|---------------|-----------|---------------------------|-------------------------|
| Acid Extractables Organic Compounds (EPA 625): | | | 8/29/02; 0112 | PMW |
| Pentachlorophenol | BQL | 50 µg/L | | |
| Phenol | BQL | 10 µg/L | | |
| 2,4,6-Trichlorophenol | BQL | 10 µg/L | | |
| Volatile Organic Compounds (EPA 624): | | | 8/23/02; 0713 | BP |
| Benzene | BQL | 10 µg/L | | |
| Bromoform | BQL | 10 µg/L | | |
| Carbon Tetrachloride | BQL | 10 µg/L | | |
| Chlorodibromomethane | BQL | 10 µg/L | | |
| Chloroform | BQL | 10 µg/L | | |
| Chloromethane | BQL | 20 µg/L | | |
| Dichloromethane | BQL | 10 µg/L | | |
| Dichlorobromomethane | BQL | 20 µg/L | | |
| 1,2-Dichloroethane | BQL | 10 µg/L | | |
| Ethylbenzene | BQL | 10 µg/L | | |
| Monochlorobenzene | BQL | 50 µg/L | | |
| Tetrachloroethylene | BQL | 10 µg/L | | |
| Toluene | BQL | 10 µg/L | | |
| Trichloroethylene | BQL | 10 µg/L | | |
| Vinyl chloride | BQL | 10 µg/L | | |

Attachment G

Wasteload and Limit Calculations

- **Mixing Zone Calculations (MIXER)**
- **Antidegradation Wasteload Allocation Spreadsheet**
- **STATS Program Results**

Mixing Zone Predictions for

Pembroke WWTP

Effluent Flow = 0.20 MGD
Stream 7Q10 = 486 MGD
Stream 30Q10 = 600 MGD
Stream 1Q10 = 407 MGD
Stream slope = 0.0013 ft/ft
Stream width = 750 ft
Bottom scale = 4
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.7837 ft
Length = 259720.68 ft
Velocity = .5626 ft/sec
Residence Time = 5.3431 days

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 37.43% of the 7Q10 is used.

Mixing Zone Predictions @ 30Q10

Depth = 2.0245 ft
Length = 233609.89 ft
Velocity = .6119 ft/sec
Residence Time = 4.4187 days

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 45.26% of the 30Q10 is used.

Mixing Zone Predictions @ 1Q10

Depth = 1.6033 ft
Length = 283939.31 ft
Velocity = .5242 ft/sec
Residence Time = 150.4667 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than .66% of the 1Q10 is used.

FRESHWATER WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: **Pembroke WWTP**

Permit No.: **VA0088048**

Receiving Stream: **New River**

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

| | |
|----------------------------------|------------|
| Mean Hardness (as CaCO3) = | 67.8 mg/L |
| 90% Temperature (Annual) = | 24.2 deg C |
| 90% Temperature (Wet season) = | 17 deg C |
| 90% Maximum pH = | 8.3 SU |
| 10% Maximum pH = | 7.1 SU |
| Tier Designation (1 or 2) = | 2 |
| Public Water Supply (PWS) Y/N? = | n |
| Trout Present Y/N? = | n |
| Early Life Stages Present Y/N? = | y |

Stream Flows

| | |
|----------------------|----------|
| 1Q10 (Annual) = | 407 MGD |
| 7Q10 (Annual) = | 486 MGD |
| 30Q10 (Annual) = | 600 MGD |
| 1Q10 (Wet season) = | 600 MGD |
| 30Q10 (Wet season) = | 1087 MGD |
| 30Q5 = | 708 MGD |
| Harmonic Mean = | 1605 MGD |

Mixing Information

| | |
|-------------------------|---------|
| Annual - 1Q10 Mix = | 0.66 % |
| - 7Q10 Mix = | 37.43 % |
| - 30Q10 Mix = | 45.26 % |
| Wet Season - 1Q10 Mix = | 100 % |
| - 30Q10 Mix = | 100 % |

Effluent Information

| | |
|----------------------------|------------|
| Mean Hardness (as CaCO3) = | 53.8 mg/L |
| 90% Temp (Annual) = | 22.5 deg C |
| 90% Temp (Wet season) = | 16.6 deg C |
| 90% Maximum pH = | 7.9 SU |
| 10% Maximum pH = | 6.2 SU |
| Discharge Flow = | 0.2 MGD |

| Parameter (ug/l unless noted) | Background Conc. | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | Most Limiting Allocations | | | |
|---|---------------------|------------------------|----------|----------|---------|-----------------------|---------|----------|---------|--------------------------|----------|----------|---------|-----------------------------|---------|----------|---------|---------------------------|---------|----------|---------|
| | | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH |
| Acenaphthene | 0 | -- | -- | na | 9.9E+02 | -- | -- | na | 3.5E+06 | -- | -- | na | 9.9E+01 | -- | -- | na | 3.5E+05 | -- | -- | na | 3.5E+05 |
| Acrolein | 0 | -- | -- | na | 9.3E+00 | -- | -- | na | 3.3E+04 | -- | -- | na | 9.3E-01 | -- | -- | na | 3.3E+03 | -- | -- | na | 3.3E+03 |
| Acrylonitrile ^C | 0 | -- | -- | na | 2.5E+00 | -- | -- | na | 2.0E+04 | -- | -- | na | 2.5E-01 | -- | -- | na | 2.0E+03 | -- | -- | na | 2.0E+03 |
| Aldrin ^C | 0 | 3.0E+00 | -- | na | 5.0E-04 | 4.3E+01 | -- | na | 4.0E+00 | 7.5E-01 | -- | na | 5.0E-05 | 1.5E+03 | -- | na | 4.0E-01 | 4.3E+01 | -- | na | 4.0E-01 |
| Ammonia-N (mg/l) (Yearly) | 0 | 5.13E+00 | 8.17E-01 | na | -- | 7.4E+01 | 1.1E+03 | na | -- | 1.18E+00 | 2.04E-01 | na | -- | 2.4E+03 | 6.1E+02 | na | -- | 7.4E+01 | 6.1E+02 | na | -- |
| Ammonia-N (mg/l) (High Flow) | 0 | 4.72E+00 | 1.30E+00 | na | -- | 1.4E+04 | 7.1E+03 | na | -- | 1.18E+00 | 3.25E-01 | na | -- | 3.5E+03 | 1.8E+03 | na | -- | 3.5E+03 | 1.8E+03 | na | -- |
| Anthracene | 0 | -- | -- | na | 4.0E+04 | -- | -- | na | 1.4E+08 | -- | -- | na | 4.0E+03 | -- | -- | na | 1.4E+07 | -- | -- | na | 1.4E+07 |
| Antimony | 0 | -- | -- | na | 6.4E+02 | -- | -- | na | 2.3E+06 | -- | -- | na | 6.4E+01 | -- | -- | na | 2.3E+05 | -- | -- | na | 2.3E+05 |
| Arsenic | 0 | 3.4E+02 | 1.5E+02 | na | -- | 4.9E+03 | 1.4E+05 | na | -- | 8.5E+01 | 3.8E+01 | na | -- | 1.7E+05 | 9.1E+04 | na | -- | 4.9E+03 | 9.1E+04 | na | -- |
| Barium | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Benzene ^C | 0 | -- | -- | na | 5.1E+02 | -- | -- | na | 4.1E+06 | -- | -- | na | 5.1E+01 | -- | -- | na | 4.1E+05 | -- | -- | na | 4.1E+05 |
| Benzidine ^C | 0 | -- | -- | na | 2.0E-03 | -- | -- | na | 1.6E+01 | -- | -- | na | 2.0E-04 | -- | -- | na | 1.6E+00 | -- | -- | na | 1.6E+00 |
| Benzo (a) anthracene ^C | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.4E+03 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.4E+02 | -- | -- | na | 1.4E+02 |
| Benzo (b) fluoranthene ^C | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.4E+03 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.4E+02 | -- | -- | na | 1.4E+02 |
| Benzo (k) fluoranthene ^C | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.4E+03 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.4E+02 | -- | -- | na | 1.4E+02 |
| Benzo (a) pyrene ^C | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.4E+03 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.4E+02 | -- | -- | na | 1.4E+02 |
| Bis(2-Chloroethyl) Ether ^C | 0 | -- | -- | na | 5.3E+00 | -- | -- | na | 4.3E+04 | -- | -- | na | 5.3E-01 | -- | -- | na | 4.3E+03 | -- | -- | na | 4.3E+03 |
| Bis(2-Chloroisopropyl) Ether | 0 | -- | -- | na | 6.5E+04 | -- | -- | na | 2.3E+08 | -- | -- | na | 6.5E+03 | -- | -- | na | 2.3E+07 | -- | -- | na | 2.3E+07 |
| Bis 2-Ethylhexyl Phthalate ^C | 0 | -- | -- | na | 2.2E+01 | -- | -- | na | 1.8E+05 | -- | -- | na | 2.2E+00 | -- | -- | na | 1.8E+04 | -- | -- | na | 1.8E+04 |
| Bromoform ^C | 0 | -- | -- | na | 1.4E+03 | -- | -- | na | 1.1E+07 | -- | -- | na | 1.4E+02 | -- | -- | na | 1.1E+06 | -- | -- | na | 1.1E+06 |
| Butylbenzylphthalate | 0 | -- | -- | na | 1.9E+03 | -- | -- | na | 6.7E+06 | -- | -- | na | 1.9E+02 | -- | -- | na | 6.7E+05 | -- | -- | na | 6.7E+05 |
| Cadmium | 0 | 2.5E+00 | 8.4E-01 | na | -- | 3.6E+01 | 7.6E+02 | na | -- | 6.3E-01 | 2.1E-01 | na | -- | 1.3E+03 | 5.1E+02 | na | -- | 3.6E+01 | 5.1E+02 | na | -- |
| Carbon Tetrachloride ^C | 0 | -- | -- | na | 1.6E+01 | -- | -- | na | 1.3E+05 | -- | -- | na | 1.6E+00 | -- | -- | na | 1.3E+04 | -- | -- | na | 1.3E+04 |
| Chlordane ^C | 0 | 2.4E+00 | 4.3E-03 | na | 8.1E-03 | 3.5E+01 | 3.9E+00 | na | 6.5E+01 | 6.0E-01 | 1.1E-03 | na | 8.1E-04 | 1.2E+03 | 2.6E+00 | na | 6.5E+00 | 3.5E+01 | 2.6E+00 | na | 6.5E+00 |
| Chloride | 0 | 8.6E+05 | 2.3E+05 | na | -- | 1.2E+07 | 2.1E+08 | na | -- | 2.2E+05 | 5.8E+04 | na | -- | 4.4E+08 | 1.4E+08 | na | -- | 1.2E+07 | 1.4E+08 | na | -- |
| TRC | 0 | 1.9E+01 | 1.1E+01 | na | -- | 2.7E+02 | 1.0E+04 | na | -- | 4.8E+00 | 2.8E+00 | na | -- | 9.7E+03 | 6.7E+03 | na | -- | 2.7E+02 | 6.7E+03 | na | -- |
| Chlorobenzene | 0 | -- | -- | na | 1.6E+03 | -- | -- | na | 5.7E+06 | -- | -- | na | 1.6E+02 | -- | -- | na | 5.7E+05 | -- | -- | na | 5.7E+05 |

| Parameter (ug/l unless noted) | Background Conc. | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | Most Limiting Allocations | | | |
|--|---------------------|------------------------|---------|----------|---------|-----------------------|---------|----------|---------|--------------------------|---------|----------|---------|-----------------------------|---------|----------|---------|---------------------------|---------|----------|---------|
| | | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH |
| Chlorodibromomethane ^C | 0 | -- | -- | na | 1.3E+02 | -- | -- | na | 1.0E+06 | -- | -- | na | 1.3E+01 | -- | -- | na | 1.0E+05 | -- | -- | na | 1.0E+05 |
| Chloroform | 0 | -- | -- | na | 1.1E+04 | -- | -- | na | 3.9E+07 | -- | -- | na | 1.1E+03 | -- | -- | na | 3.9E+06 | -- | -- | na | 3.9E+06 |
| 2-Chloronaphthalene | 0 | -- | -- | na | 1.6E+03 | -- | -- | na | 5.7E+06 | -- | -- | na | 1.6E+02 | -- | -- | na | 5.7E+05 | -- | -- | na | 5.7E+05 |
| 2-Chlorophenol | 0 | -- | -- | na | 1.5E+02 | -- | -- | na | 5.3E+05 | -- | -- | na | 1.5E+01 | -- | -- | na | 5.3E+04 | -- | -- | na | 5.3E+04 |
| Chlorpyrifos | 0 | 8.3E-02 | 4.1E-02 | na | -- | 1.2E+00 | 3.7E+01 | na | -- | 2.1E-02 | 1.0E-02 | na | -- | 4.2E+01 | 2.5E+01 | na | -- | 1.2E+00 | 2.5E+01 | na | -- |
| Chromium III | 0 | 4.1E+02 | 5.4E+01 | na | -- | 5.9E+03 | 4.9E+04 | na | -- | 1.0E+02 | 1.3E+01 | na | -- | 2.1E+05 | 3.3E+04 | na | -- | 5.9E+03 | 3.3E+04 | na | -- |
| Chromium VI | 0 | 1.6E+01 | 1.1E+01 | na | -- | 2.3E+02 | 1.0E+04 | na | -- | 4.0E+00 | 2.8E+00 | na | -- | 8.1E+03 | 6.7E+03 | na | -- | 2.3E+02 | 6.7E+03 | na | -- |
| Chromium, Total | 0 | -- | -- | 1.0E+02 | -- | -- | -- | na | -- | -- | -- | 1.0E+01 | -- | -- | -- | 3.5E+04 | -- | -- | -- | na | -- |
| Chrysene ^C | 0 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.4E+02 | -- | -- | na | 1.8E-03 | -- | -- | na | 1.4E+01 | -- | -- | na | 1.4E+01 |
| Copper | 1.61 | 9.2E+00 | 6.4E+00 | na | -- | 1.1E+02 | 4.4E+03 | na | -- | 3.5E+00 | 2.8E+00 | na | -- | 3.9E+03 | 2.9E+03 | na | -- | 1.1E+02 | 2.9E+03 | na | -- |
| Cyanide, Free | 0 | 2.2E+01 | 5.2E+00 | na | 1.6E+04 | 3.2E+02 | 4.7E+03 | na | 5.7E+07 | 5.5E+00 | 1.3E+00 | na | 1.6E+03 | 1.1E+04 | 3.2E+03 | na | 5.7E+06 | 3.2E+02 | 3.2E+03 | na | 5.7E+06 |
| DDD ^C | 0 | -- | -- | na | 3.1E-03 | -- | -- | na | 2.5E+01 | -- | -- | na | 3.1E-04 | -- | -- | na | 2.5E+00 | -- | -- | na | 2.5E+00 |
| DDE ^C | 0 | -- | -- | na | 2.2E-03 | -- | -- | na | 1.8E+01 | -- | -- | na | 2.2E-04 | -- | -- | na | 1.8E+00 | -- | -- | na | 1.8E+00 |
| DDT ^C | 0 | 1.1E+00 | 1.0E-03 | na | 2.2E-03 | 1.6E+01 | 9.1E-01 | na | 1.8E+01 | 2.8E-01 | 2.5E-04 | na | 2.2E-04 | 5.6E+02 | 6.1E-01 | na | 1.8E+00 | 1.6E+01 | 6.1E-01 | na | 1.8E+00 |
| Demeton | 0 | -- | 1.0E-01 | na | -- | -- | 9.1E+01 | na | -- | -- | 2.5E-02 | na | -- | -- | 6.1E+01 | na | -- | -- | 6.1E+01 | na | -- |
| Diazinon | 0 | 1.7E-01 | 1.7E-01 | na | -- | 2.5E+00 | 1.5E+02 | na | -- | 4.3E-02 | 4.3E-02 | na | -- | 8.7E+01 | 1.0E+02 | na | -- | 2.5E+00 | 1.0E+02 | na | -- |
| Dibenz(a,h)anthracene ^C | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.4E+03 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.4E+02 | -- | -- | na | 1.4E+02 |
| 1,2-Dichlorobenzene | 0 | -- | -- | na | 1.3E+03 | -- | -- | na | 4.6E+06 | -- | -- | na | 1.3E+02 | -- | -- | na | 4.6E+05 | -- | -- | na | 4.6E+05 |
| 1,3-Dichlorobenzene | 0 | -- | -- | na | 9.6E+02 | -- | -- | na | 3.4E+06 | -- | -- | na | 9.6E+01 | -- | -- | na | 3.4E+05 | -- | -- | na | 3.4E+05 |
| 1,4-Dichlorobenzene | 0 | -- | -- | na | 1.9E+02 | -- | -- | na | 6.7E+05 | -- | -- | na | 1.9E+01 | -- | -- | na | 6.7E+04 | -- | -- | na | 6.7E+04 |
| 3,3-Dichlorobenzidine ^C | 0 | -- | -- | na | 2.8E-01 | -- | -- | na | 2.2E+03 | -- | -- | na | 2.8E-02 | -- | -- | na | 2.2E+02 | -- | -- | na | 2.2E+02 |
| Dichlorobromomethane ^C | 0 | -- | -- | na | 1.7E+02 | -- | -- | na | 1.4E+06 | -- | -- | na | 1.7E+01 | -- | -- | na | 1.4E+05 | -- | -- | na | 1.4E+05 |
| 1,2-Dichloroethane ^C | 0 | -- | -- | na | 3.7E+02 | -- | -- | na | 3.0E+06 | -- | -- | na | 3.7E+01 | -- | -- | na | 3.0E+05 | -- | -- | na | 3.0E+05 |
| 1,1-Dichloroethylene | 0 | -- | -- | na | 7.1E+03 | -- | -- | na | 2.5E+07 | -- | -- | na | 7.1E+02 | -- | -- | na | 2.5E+06 | -- | -- | na | 2.5E+06 |
| 1,2-trans-dichloroethylene | 0 | -- | -- | na | 1.0E+04 | -- | -- | na | 3.5E+07 | -- | -- | na | 1.0E+03 | -- | -- | na | 3.5E+06 | -- | -- | na | 3.5E+06 |
| 2,4-Dichlorophenol | 0 | -- | -- | na | 2.9E+02 | -- | -- | na | 1.0E+06 | -- | -- | na | 2.9E+01 | -- | -- | na | 1.0E+05 | -- | -- | na | 1.0E+05 |
| 2,4-Dichlorophenoxy acetic acid (2,4-D) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| 1,2-Dichloropropane ^C | 0 | -- | -- | na | 1.5E+02 | -- | -- | na | 1.2E+06 | -- | -- | na | 1.5E+01 | -- | -- | na | 1.2E+05 | -- | -- | na | 1.2E+05 |
| 1,3-Dichloropropene ^C | 0 | -- | -- | na | 2.1E+02 | -- | -- | na | 1.7E+06 | -- | -- | na | 2.1E+01 | -- | -- | na | 1.7E+05 | -- | -- | na | 1.7E+05 |
| Dieldrin ^C | 0 | 2.4E-01 | 5.6E-02 | na | 5.4E-04 | 3.5E+00 | 5.1E+01 | na | 4.3E+00 | 6.0E-02 | 1.4E-02 | na | 5.4E-05 | 1.2E+02 | 3.4E+01 | na | 4.3E-01 | 3.5E+00 | 3.4E+01 | na | 4.3E-01 |
| Diethyl Phthalate | 0 | -- | -- | na | 4.4E+04 | -- | -- | na | 1.6E+08 | -- | -- | na | 4.4E+03 | -- | -- | na | 1.6E+07 | -- | -- | na | 1.6E+07 |
| 2,4-Dimethylphenol | 0 | -- | -- | na | 8.5E+02 | -- | -- | na | 3.0E+06 | -- | -- | na | 8.5E+01 | -- | -- | na | 3.0E+05 | -- | -- | na | 3.0E+05 |
| Dimethyl Phthalate | 0 | -- | -- | na | 1.1E+06 | -- | -- | na | 3.9E+09 | -- | -- | na | 1.1E+05 | -- | -- | na | 3.9E+08 | -- | -- | na | 3.9E+08 |
| Di-n-Butyl Phthalate | 0 | -- | -- | na | 4.5E+03 | -- | -- | na | 1.6E+07 | -- | -- | na | 4.5E+02 | -- | -- | na | 1.6E+06 | -- | -- | na | 1.6E+06 |
| 2,4 Dinitrophenol | 0 | -- | -- | na | 5.3E+03 | -- | -- | na | 1.9E+07 | -- | -- | na | 5.3E+02 | -- | -- | na | 1.9E+06 | -- | -- | na | 1.9E+06 |
| 2-Methyl-4,6-Dinitrophenol | 0 | -- | -- | na | 2.8E+02 | -- | -- | na | 9.9E+05 | -- | -- | na | 2.8E+01 | -- | -- | na | 9.9E+04 | -- | -- | na | 9.9E+04 |
| 2,4-Dinitrotoluene ^C | 0 | -- | -- | na | 3.4E+01 | -- | -- | na | 2.7E+05 | -- | -- | na | 3.4E+00 | -- | -- | na | 2.7E+04 | -- | -- | na | 2.7E+04 |
| Dioxin 2,3,7,8- tetrachlorodibenzo-p-dioxin | 0 | -- | -- | na | 5.1E-08 | -- | -- | na | 1.8E-04 | -- | -- | na | 5.1E-09 | -- | -- | na | 1.8E-05 | -- | -- | na | 1.8E-05 |
| 1,2-Diphenylhydrazine ^C | 0 | -- | -- | na | 2.0E+00 | -- | -- | na | 1.6E+04 | -- | -- | na | 2.0E-01 | -- | -- | na | 1.6E+03 | -- | -- | na | 1.6E+03 |
| Alpha-Endosulfan | 0 | 2.2E-01 | 5.6E-02 | na | 8.9E+01 | 3.2E+00 | 5.1E+01 | na | 3.2E+05 | 5.5E-02 | 1.4E-02 | na | 8.9E+00 | 1.1E+02 | 3.4E+01 | na | 3.2E+04 | 3.2E+00 | 3.4E+01 | na | 3.2E+04 |
| Beta-Endosulfan | 0 | 2.2E-01 | 5.6E-02 | na | 8.9E+01 | 3.2E+00 | 5.1E+01 | na | 3.2E+05 | 5.5E-02 | 1.4E-02 | na | 8.9E+00 | 1.1E+02 | 3.4E+01 | na | 3.2E+04 | 3.2E+00 | 3.4E+01 | na | 3.2E+04 |
| Alpha + Beta Endosulfan | 0 | 2.2E-01 | 5.6E-02 | -- | -- | 3.2E+00 | 5.1E+01 | -- | -- | 5.5E-02 | 1.4E-02 | -- | -- | 1.1E+02 | 3.4E+01 | -- | -- | 3.2E+00 | 3.4E+01 | -- | -- |
| Endosulfan Sulfate | 0 | -- | -- | na | 8.9E+01 | -- | -- | na | 3.2E+05 | -- | -- | na | 8.9E+00 | -- | -- | na | 3.2E+04 | -- | -- | na | 3.2E+04 |
| Endrin | 0 | 8.6E-02 | 3.6E-02 | na | 6.0E-02 | 1.2E+00 | 3.3E+01 | na | 2.1E+02 | 2.2E-02 | 9.0E-03 | na | 6.0E-03 | 4.4E+01 | 2.2E+01 | na | 2.1E+01 | 1.2E+00 | 2.2E+01 | na | 2.1E+01 |
| Endrin Aldehyde | 0 | -- | -- | na | 3.0E-01 | -- | -- | na | 1.1E+03 | -- | -- | na | 3.0E-02 | -- | -- | na | 1.1E+02 | -- | -- | na | 1.1E+02 |

| Parameter (ug/l unless noted) | Background Conc. | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | Most Limiting Allocations | | | |
|--|---------------------|------------------------|---------|----------|---------|-----------------------|---------|----------|---------|--------------------------|---------|----------|---------|-----------------------------|---------|----------|---------|---------------------------|---------|----------|---------|
| | | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH |
| Ethylbenzene | 0 | -- | -- | na | 2.1E+03 | -- | -- | na | 7.4E+06 | -- | -- | na | 2.1E+02 | -- | -- | na | 7.4E+05 | -- | -- | na | 7.4E+05 |
| Fluoranthene | 0 | -- | -- | na | 1.4E+02 | -- | -- | na | 5.0E+05 | -- | -- | na | 1.4E+01 | -- | -- | na | 5.0E+04 | -- | -- | na | 5.0E+04 |
| Fluorene | 0 | -- | -- | na | 5.3E+03 | -- | -- | na | 1.9E+07 | -- | -- | na | 5.3E+02 | -- | -- | na | 1.9E+06 | -- | -- | na | 1.9E+06 |
| Foaming Agents | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Guthion | 0 | -- | 1.0E-02 | na | -- | -- | 9.1E+00 | na | -- | -- | 2.5E-03 | na | -- | -- | 6.1E+00 | na | -- | -- | 6.1E+00 | na | -- |
| Heptachlor ^C | 0 | 5.2E-01 | 3.8E-03 | na | 7.9E-04 | 7.5E+00 | 3.5E+00 | na | 6.3E+00 | 1.3E-01 | 9.5E-04 | na | 7.9E-05 | 2.6E+02 | 2.3E+00 | na | 6.3E-01 | 7.5E+00 | 2.3E+00 | na | 6.3E-01 |
| Heptachlor Epoxide ^C | 0 | 5.2E-01 | 3.8E-03 | na | 3.9E-04 | 7.5E+00 | 3.5E+00 | na | 3.1E+00 | 1.3E-01 | 9.5E-04 | na | 3.9E-05 | 2.6E+02 | 2.3E+00 | na | 3.1E-01 | 7.5E+00 | 2.3E+00 | na | 3.1E-01 |
| Hexachlorobenzene ^C | 0 | -- | -- | na | 2.9E-03 | -- | -- | na | 2.3E+01 | -- | -- | na | 2.9E-04 | -- | -- | na | 2.3E+00 | -- | -- | na | 2.3E+00 |
| Hexachlorobutadiene ^C | 0 | -- | -- | na | 1.8E+02 | -- | -- | na | 1.4E+06 | -- | -- | na | 1.8E+01 | -- | -- | na | 1.4E+05 | -- | -- | na | 1.4E+05 |
| Hexachlorocyclohexane | | | | | | | | | | | | | | | | | | | | | |
| Alpha-BHC ^C | 0 | -- | -- | na | 4.9E-02 | -- | -- | na | 3.9E+02 | -- | -- | na | 4.9E-03 | -- | -- | na | 3.9E+01 | -- | -- | na | 3.9E+01 |
| Hexachlorocyclohexane | | | | | | | | | | | | | | | | | | | | | |
| Beta-BHC ^C | 0 | -- | -- | na | 1.7E-01 | -- | -- | na | 1.4E+03 | -- | -- | na | 1.7E-02 | -- | -- | na | 1.4E+02 | -- | -- | na | 1.4E+02 |
| Hexachlorocyclohexane | | | | | | | | | | | | | | | | | | | | | |
| Gamma-BHC ^C (Lindane) | 0 | 9.5E-01 | na | na | 1.8E+00 | 1.4E+01 | -- | na | 1.4E+04 | 2.4E-01 | -- | na | 1.8E-01 | 4.8E+02 | -- | na | 1.4E+03 | 1.4E+01 | -- | na | 1.4E+03 |
| Hexachlorocyclopentadiene | 0 | -- | -- | na | 1.1E+03 | -- | -- | na | 3.9E+06 | -- | -- | na | 1.1E+02 | -- | -- | na | 3.9E+05 | -- | -- | na | 3.9E+05 |
| Hexachloroethane ^C | 0 | -- | -- | na | 3.3E+01 | -- | -- | na | 2.6E+05 | -- | -- | na | 3.3E+00 | -- | -- | na | 2.6E+04 | -- | -- | na | 2.6E+04 |
| Hydrogen Sulfide | 0 | -- | 2.0E+00 | na | -- | -- | 1.8E+03 | na | -- | -- | 5.0E-01 | na | -- | -- | 1.2E+03 | na | -- | -- | 1.2E+03 | na | -- |
| Indeno (1,2,3-cd) pyrene ^C | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.4E+03 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.4E+02 | -- | -- | na | 1.4E+02 |
| Iron | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Isophorone ^C | 0 | -- | -- | na | 9.6E+03 | -- | -- | na | 7.7E+07 | -- | -- | na | 9.6E+02 | -- | -- | na | 7.7E+06 | -- | -- | na | 7.7E+06 |
| Kepone | 0 | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- |
| Lead | 0 | 7.1E+01 | 8.2E+00 | na | -- | 1.0E+03 | 7.5E+03 | na | -- | 1.8E+01 | 2.1E+00 | na | -- | 3.7E+04 | 5.0E+03 | na | -- | 1.0E+03 | 5.0E+03 | na | -- |
| Malathion | 0 | -- | 1.0E-01 | na | -- | -- | 9.1E+01 | na | -- | -- | 2.5E-02 | na | -- | -- | 6.1E+01 | na | -- | -- | 6.1E+01 | na | -- |
| Manganese | 78.9 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Mercury | 0 | 1.4E+00 | 7.7E-01 | -- | -- | 2.0E+01 | 7.0E+02 | -- | -- | 3.5E-01 | 1.9E-01 | -- | -- | 7.1E+02 | 4.7E+02 | -- | -- | 2.0E+01 | 4.7E+02 | -- | -- |
| Methyl Bromide | 0 | -- | -- | na | 1.5E+03 | -- | -- | na | 5.3E+06 | -- | -- | na | 1.5E+02 | -- | -- | na | 5.3E+05 | -- | -- | na | 5.3E+05 |
| Methylene Chloride ^C | 0 | -- | -- | na | 5.9E+03 | -- | -- | na | 4.7E+07 | -- | -- | na | 5.9E+02 | -- | -- | na | 4.7E+06 | -- | -- | na | 4.7E+06 |
| Methoxychlor | 0 | -- | 3.0E-02 | na | -- | -- | 2.7E+01 | na | -- | -- | 7.5E-03 | na | -- | -- | 1.8E+01 | na | -- | -- | 1.8E+01 | na | -- |
| Mirex | 0 | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- |
| Nickel | 0 | 1.3E+02 | 1.5E+01 | na | 4.6E+03 | 1.9E+03 | 1.3E+04 | na | 1.6E+07 | 3.3E+01 | 3.6E+00 | na | 4.6E+02 | 6.7E+04 | 8.9E+03 | na | 1.6E+06 | 1.9E+03 | 8.9E+03 | na | 1.6E+06 |
| Nitrate (as N) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Nitrobenzene | 0 | -- | -- | na | 6.9E+02 | -- | -- | na | 2.4E+06 | -- | -- | na | 6.9E+01 | -- | -- | na | 2.4E+05 | -- | -- | na | 2.4E+05 |
| N-Nitrosodimethylamine ^C | 0 | -- | -- | na | 3.0E+01 | -- | -- | na | 2.4E+05 | -- | -- | na | 3.0E+00 | -- | -- | na | 2.4E+04 | -- | -- | na | 2.4E+04 |
| N-Nitrosodiphenylamine ^C | 0 | -- | -- | na | 6.0E+01 | -- | -- | na | 4.8E+05 | -- | -- | na | 6.0E+00 | -- | -- | na | 4.8E+04 | -- | -- | na | 4.8E+04 |
| N-Nitrosodi-n-propylamine ^C | 0 | -- | -- | na | 5.1E+00 | -- | -- | na | 4.1E+04 | -- | -- | na | 5.1E-01 | -- | -- | na | 4.1E+03 | -- | -- | na | 4.1E+03 |
| Nonylphenol | 0 | 2.8E+01 | 6.6E+00 | -- | -- | 4.0E+02 | 6.0E+03 | na | -- | 7.0E+00 | 1.7E+00 | -- | -- | 1.4E+04 | 4.0E+03 | -- | -- | 4.0E+02 | 4.0E+03 | na | -- |
| Parathion | 0 | 6.5E-02 | 1.3E-02 | na | -- | 9.4E-01 | 1.2E+01 | na | -- | 1.6E-02 | 3.3E-03 | na | -- | 3.3E+01 | 7.9E+00 | na | -- | 9.4E-01 | 7.9E+00 | na | -- |
| PCB Total ^C | 0 | -- | 1.4E-02 | na | 6.4E-04 | -- | 1.3E+01 | na | 5.1E+00 | -- | 3.5E-03 | na | 6.4E-05 | -- | 8.5E+00 | na | 5.1E-01 | -- | 8.5E+00 | na | 5.1E-01 |
| Pentachlorophenol ^C | 0 | 8.1E+00 | 7.4E+00 | na | 3.0E+01 | 1.2E+02 | 6.7E+03 | na | 2.4E+05 | 2.4E+00 | 1.8E+00 | na | 3.0E+00 | 4.9E+03 | 4.5E+03 | na | 2.4E+04 | 1.2E+02 | 4.5E+03 | na | 2.4E+04 |
| Phenol | 0 | -- | -- | na | 8.6E+05 | -- | -- | na | 3.0E+09 | -- | -- | na | 8.6E+04 | -- | -- | na | 3.0E+08 | -- | -- | na | 3.0E+08 |
| Pyrene | 0 | -- | -- | na | 4.0E+03 | -- | -- | na | 1.4E+07 | -- | -- | na | 4.0E+02 | -- | -- | na | 1.4E+06 | -- | -- | na | 1.4E+06 |
| Radionuclides | | | | | | | | | | | | | | | | | | | | | |
| Gross Alpha Activity | | | | | | | | | | | | | | | | | | | | | |
| (pCi/L) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Beta and Photon Activity | | | | | | | | | | | | | | | | | | | | | |
| (mrem/yr) | 0 | -- | -- | na | 4.0E+00 | -- | -- | na | 1.4E+04 | -- | -- | na | 4.0E-01 | -- | -- | na | 1.4E+03 | -- | -- | na | 1.4E+03 |
| Radium 226 + 228 (pCi/L) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Uranium (ug/l) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |

| Parameter (ug/l unless noted) | Background Conc. | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | Most Limiting Allocations | | | |
|--|---------------------|------------------------|---------|----------|---------|-----------------------|---------|----------|---------|--------------------------|---------|----------|---------|-----------------------------|---------|----------|---------|---------------------------|---------|----------|---------|
| | | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH |
| Selenium, Total Recoverable | 0 | 2.0E+01 | 5.0E+00 | na | 4.2E+03 | 2.9E+02 | 4.6E+03 | na | 1.5E+07 | 5.0E+00 | 1.3E+00 | na | 4.2E+02 | 1.0E+04 | 3.0E+03 | na | 1.5E+06 | 2.9E+02 | 3.0E+03 | na | 1.5E+06 |
| Silver | 0 | 1.7E+00 | -- | na | -- | 2.5E+01 | -- | na | -- | 4.4E-01 | -- | na | -- | 9.0E+02 | -- | na | -- | 2.5E+01 | -- | na | -- |
| Sulfate | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| 1,1,2,2-Tetrachloroethane ^C | 0 | -- | -- | na | 4.0E+01 | -- | -- | na | 3.2E+05 | -- | -- | na | 4.0E+00 | -- | -- | na | 3.2E+04 | -- | -- | na | 3.2E+04 |
| Tetrachloroethylene ^C | 0 | -- | -- | na | 3.3E+01 | -- | -- | na | 2.6E+05 | -- | -- | na | 3.3E+00 | -- | -- | na | 2.6E+04 | -- | -- | na | 2.6E+04 |
| Thallium | 0 | -- | -- | na | 4.7E-01 | -- | -- | na | 1.7E+03 | -- | -- | na | 4.7E-02 | -- | -- | na | 1.7E+02 | -- | -- | na | 1.7E+02 |
| Toluene | 0 | -- | -- | na | 6.0E+03 | -- | -- | na | 2.1E+07 | -- | -- | na | 6.0E+02 | -- | -- | na | 2.1E+06 | -- | -- | na | 2.1E+06 |
| Total dissolved solids | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Toxaphene ^C | 0 | 7.3E-01 | 2.0E-04 | na | 2.8E-03 | 1.1E+01 | 1.8E-01 | na | 2.2E+01 | 1.8E-01 | 5.0E-05 | na | 2.8E-04 | 3.7E+02 | 1.2E-01 | na | 2.2E+00 | 1.1E+01 | 1.2E-01 | na | 2.2E+00 |
| Tributyltin | 0 | 4.6E-01 | 7.2E-02 | na | -- | 6.6E+00 | 6.6E+01 | na | -- | 1.2E-01 | 1.8E-02 | na | -- | 2.3E+02 | 4.4E+01 | na | -- | 6.6E+00 | 4.4E+01 | na | -- |
| 1,2,4-Trichlorobenzene | 0 | -- | -- | na | 7.0E+01 | -- | -- | na | 2.5E+05 | -- | -- | na | 7.0E+00 | -- | -- | na | 2.5E+04 | -- | -- | na | 2.5E+04 |
| 1,1,2-Trichloroethane ^C | 0 | -- | -- | na | 1.6E+02 | -- | -- | na | 1.3E+06 | -- | -- | na | 1.6E+01 | -- | -- | na | 1.3E+05 | -- | -- | na | 1.3E+05 |
| Trichloroethylene ^C | 0 | -- | -- | na | 3.0E+02 | -- | -- | na | 2.4E+06 | -- | -- | na | 3.0E+01 | -- | -- | na | 2.4E+05 | -- | -- | na | 2.4E+05 |
| 2,4,6-Trichlorophenol ^C | 0 | -- | -- | na | 2.4E+01 | -- | -- | na | 1.9E+05 | -- | -- | na | 2.4E+00 | -- | -- | na | 1.9E+04 | -- | -- | na | 1.9E+04 |
| 2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Vinyl Chloride ^C | 0 | -- | -- | na | 2.4E+01 | -- | -- | na | 1.9E+05 | -- | -- | na | 2.4E+00 | -- | -- | na | 1.9E+04 | -- | -- | na | 1.9E+04 |
| Zinc | 7.26 | 8.3E+01 | 8.5E+01 | na | 2.6E+04 | 1.1E+03 | 7.1E+04 | na | 9.2E+07 | 2.7E+01 | 2.7E+01 | na | 2.6E+03 | 3.9E+04 | 4.7E+04 | na | 9.2E+06 | 1.1E+03 | 4.7E+04 | na | 9.2E+06 |

Notes:

- All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
- Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
- Metals measured as Dissolved, unless specified otherwise
- "C" indicates a carcinogenic parameter
- Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
Antidegradation WLAs are based upon a complete mix.
- Antideg. Baseline = $(0.25(WQC - \text{background conc.}) + \text{background conc.})$ for acute and chronic
= $(0.1(WQC - \text{background conc.}) + \text{background conc.})$ for human health
- WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

| Metal | Target Value (SSTV) |
|--------------|---------------------|
| Antimony | 2.3E+05 |
| Arsenic | 2.0E+03 |
| Barium | na |
| Cadmium | 1.4E+01 |
| Chromium III | 2.4E+03 |
| Chromium VI | 9.2E+01 |
| Copper | 4.4E+01 |
| Iron | na |
| Lead | 4.1E+02 |
| Manganese | na |
| Mercury | 8.1E+00 |
| Nickel | 7.5E+02 |
| Selenium | 1.2E+02 |
| Silver | 1.0E+01 |
| Zinc | 4.4E+02 |

Note: do not use QL's lower than the minimum QL's provided in agency guidance

0.200 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

| | | | | | | | | |
|--|-------------------|---------------------------------|-----------------------|-------------------|-------------------------------------|--------|---------------------------------------|--------|
| Discharge Flow Used for WQS-WLA Calculations (MGD) 0.200 | | | | | Ammonia - Dry Season - Acute | | Ammonia - Dry Season - Chronic | |
| <u>Stream Flows</u> | | <u>Total Mix Flows</u> | | | 90th Percentile pH (SU) | 8.257 | 90th Percentile Temp. (deg C) | 24.199 |
| <u>Allocated to Mix (MGD)</u> | | <u>Stream + Discharge (MGD)</u> | | | (7.204 - pH) | -1.053 | 90th Percentile pH (SU) | 8.300 |
| | <u>Dry Season</u> | <u>Wet Season</u> | <u>Dry Season</u> | <u>Wet Season</u> | (pH - 7.204) | 1.053 | MIN | 1.527 |
| 1Q10 | 2.686 | 600.000 | 2.886 | 600.200 | Trout Present Criterion (mg N/L) | 3.426 | MAX | 24.199 |
| 7Q10 | 181.910 | N/A | 182.110 | N/A | Trout Absent Criterion (mg N/L) | 5.129 | (7.688 - pH) | -0.612 |
| 30Q10 | 271.560 | 1087.000 | 271.760 | 1087.200 | Trout Present? | n | (pH - 7.688) | 0.612 |
| 30Q5 | 708.000 | N/A | 708.200 | N/A | Effective Criterion (mg N/L) | 5.129 | Early LS Present Criterion (mg N) | 0.817 |
| Harm. Mean | 1605.000 | N/A | 1605.200 | N/A | | | Early LS Absent Criterion (mg N) | 0.817 |
| Annual Avg. | 0.000 | N/A | 0.200 | N/A | | | Early Life Stages Present? | y |
| | | | | | | | Effective Criterion (mg N/L) | 0.817 |
| <u>Stream/Discharge Mix Values</u> | | | | | Ammonia - Wet Season - Acute | | Ammonia - Wet Season - Chronic | |
| | | <u>Dry Season</u> | <u>Wet Season</u> | | 90th Percentile pH (SU) | 8.300 | 90th Percentile Temp. (deg C) | 17.000 |
| 1Q10 90th% Temp. Mix (deg C) | | 24.082 | 17.000 | | (7.204 - pH) | -1.096 | 90th Percentile pH (SU) | 8.300 |
| 30Q10 90th% Temp. Mix (deg C) | | 24.199 | 17.000 | | (pH - 7.204) | 1.096 | MIN | 2.429 |
| 1Q10 90th% pH Mix (SU) | | 8.257 | 8.300 | | Trout Present Criterion (mg N/L) | 3.150 | MAX | 17.000 |
| 30Q10 90th% pH Mix (SU) | | 8.300 | 8.300 | | Trout Absent Criterion (mg N/L) | 4.717 | (7.688 - pH) | -0.612 |
| 1Q10 10th% pH Mix (SU) | | 6.929 | N/A | | Trout Present? | n | (pH - 7.688) | 0.612 |
| 7Q10 10th% pH Mix (SU) | | 7.097 | N/A | | Effective Criterion (mg N/L) | 4.717 | Early LS Present Criterion (mg N) | 1.299 |
| | | <u>Calculated</u> | <u>Formula Inputs</u> | | | | Early LS Absent Criterion (mg N) | 1.299 |
| 1Q10 Hardness (mg/L as CaCO3) | | 66.8 | 66.8 | | | | Early Life Stages Present? | y |
| 7Q10 Hardness (mg/L as CaCO3) | | 67.8 | 67.8 | | | | Effective Criterion (mg N/L) | 1.299 |

0.200 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

| | | | | | | | | |
|--|-------------------|---------------------------------|-----------------------|-------------------|-------------------------------------|--------|---------------------------------------|--------|
| Discharge Flow Used for WQS-WLA Calculations (MGD) 0.200 | | | | | Ammonia - Dry Season - Acute | | Ammonia - Dry Season - Chronic | |
| <u>100% Stream Flows</u> | | <u>Total Mix Flows</u> | | | 90th Percentile pH (SU) | 8.300 | 90th Percentile Temp. (deg C) | 24.199 |
| <u>Allocated to Mix (MGD)</u> | | <u>Stream + Discharge (MGD)</u> | | | (7.204 - pH) | -1.096 | 90th Percentile pH (SU) | 8.300 |
| | <u>Dry Season</u> | <u>Wet Season</u> | <u>Dry Season</u> | <u>Wet Season</u> | (pH - 7.204) | 1.096 | MIN | 1.527 |
| 1Q10 | 407.000 | 600.000 | 407.200 | 600.200 | Trout Present Criterion (mg N/L) | 3.151 | MAX | 24.199 |
| 7Q10 | 486.000 | N/A | 486.200 | N/A | Trout Absent Criterion (mg N/L) | 4.718 | (7.688 - pH) | -0.612 |
| 30Q10 | 600.000 | 1087.000 | 600.200 | 1087.200 | Trout Present? | n | (pH - 7.688) | 0.612 |
| 30Q5 | 708.000 | N/A | 708.200 | N/A | Effective Criterion (mg N/L) | 4.718 | Early LS Present Criterion (mg N) | 0.817 |
| Harm. Mean | 1605.000 | N/A | 1605.200 | N/A | | | Early LS Absent Criterion (mg N) | 0.817 |
| Annual Avg. | 0.000 | N/A | 0.200 | N/A | | | Early Life Stages Present? | y |
| | | | | | | | Effective Criterion (mg N/L) | 0.817 |
| <u>Stream/Discharge Mix Values</u> | | | | | Ammonia - Wet Season - Acute | | Ammonia - Wet Season - Chronic | |
| | | <u>Dry Season</u> | <u>Wet Season</u> | | 90th Percentile pH (SU) | 8.300 | 90th Percentile Temp. (deg C) | 17.000 |
| 1Q10 90th% Temp. Mix (deg C) | | 24.199 | 17.000 | | (7.204 - pH) | -1.096 | 90th Percentile pH (SU) | 8.300 |
| 30Q10 90th% Temp. Mix (deg C) | | 24.199 | 17.000 | | (pH - 7.204) | 1.096 | MIN | 2.429 |
| 1Q10 90th% pH Mix (SU) | | 8.300 | 8.300 | | Trout Present Criterion (mg N/L) | 3.150 | MAX | 17.000 |
| 30Q10 90th% pH Mix (SU) | | 8.300 | 8.300 | | Trout Absent Criterion (mg N/L) | 4.717 | (7.688 - pH) | -0.612 |
| 1Q10 10th% pH Mix (SU) | | 7.099 | N/A | | Trout Present? | n | (pH - 7.688) | 0.612 |
| 7Q10 10th% pH Mix (SU) | | 7.099 | N/A | | Effective Criterion (mg N/L) | 4.717 | Early LS Present Criterion (mg N) | 1.299 |
| | | <u>Calculated</u> | <u>Formula Inputs</u> | | | | Early LS Absent Criterion (mg N) | 1.299 |
| 1Q10 Hardness (mg/L as CaCO3) = | | 67.793 | 67.793 | | | | Early Life Stages Present? | y |
| 7Q10 Hardness (mg/L as CaCO3) = | | 67.794 | 67.794 | | | | Effective Criterion (mg N/L) | 1.299 |

6/20/2013 9:35:55 AM

Facility = Pembroke WWTP
Chemical = hydrogen sulfide (mg/L)
Chronic averaging period = 4
WLAa =
WLAc = 1200
Q.L. = 1.0
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 1.4
Variance = .7056
C.V. = 0.6
97th percentile daily values = 3.40678
97th percentile 4 day average = 2.32930
97th percentile 30 day average = 1.68847
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

1.4

6/20/2013 9:33:29 AM

Facility = Pembroke WWTP
Chemical = total copper (ug/L)
Chronic averaging period = 4
WLAa = 110
WLAc = 2900
Q.L. = 10
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 12
Variance = 51.84
C.V. = 0.6
97th percentile daily values = 29.2010
97th percentile 4 day average = 19.9654
97th percentile 30 day average = 14.4726
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

6/20/2013 9:37:37 AM

Facility = Pembroke WWTP
Chemical = total zinc (ug/L)
Chronic averaging period = 4
WLAa = 1100
WLAc = 47000
Q.L. = 50
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 89
Variance = 2851.56
C.V. = 0.6
97th percentile daily values = 216.574
97th percentile 4 day average = 148.077
97th percentile 30 day average = 107.338
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

89

3/19/2013 2:19:01 PM

Facility = Pembroke WWTP
Chemical = TRC (ug/L)
Chronic averaging period = 4
WLAa = 270
WLAc = 6700
Q.L. = 0.2
samples/mo. = 90
samples/wk. = 23

Summary of Statistics:

observations = 1
Expected Value = 1000
Variance = 360000
C.V. = 0.6
97th percentile daily values = 2433.41
97th percentile 4 day average = 1663.79
97th percentile 30 day average = 1206.05
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity

Maximum Daily Limit = 270

Average Weekly limit = 139.181114805761

Average Monthly Limit = 124.154821746445

0.139 mg/L
0.124 mg/L

The data are:

1000

3/19/2013 2:17:13 PM

Facility = Pembroke WWTP
Chemical = ammonia (mg/L)
Chronic averaging period = 30
WLAa = 74
WLAc = 610
Q.L. = 0.2
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average = 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

Attachment H

Reduced Monitoring Evaluation Memorandum

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY *Blue Ridge Regional Office*

3019 Peters Creek Road

Roanoke, VA 24019

SUBJECT: Justification for Reduced Monitoring Frequency
Reissuance of VPDES Permit No. VA0088048
Pembroke WWTP

TO: Permit File

FROM: Becky L. France, Water Permit Writer *BLF*

DATE: May 22, 2013

Compliance History

The VPDES Permit Manual recommends effluent monitoring frequencies. Guidance Memo 98-2005 allows for reduced monitoring at facilities with excellent compliance histories. To qualify for consideration of reduced monitoring, the facility should not have been issued any Letter of Noncompliance (LON), Notice of Violation (NOV), Warning Letter, or Notice of Unsatisfactory Laboratory Evaluations, or be under any Consent Orders, Consent Decrees, Executive Compliance Agreements, or related enforcement documents during the past three years.

The facility has not received any warning letters or NOVs. A DEQ compliance inspection conducted on December 13, 2011 identified some deficiencies related to clerical errors, calculation errors, needed updates to the Operations and Maintenance Manual, requested testing documentation, and flow meter out of paper. According to a letter dated February 21, 2012, Pembroke WWTP took steps to address all of these deficiencies. A DEQ compliance inspection conducted on April 26, 2013 identified a need for increased maintenance and operations controls for solids removal and disinfection redundancy. In a letter dated April 30, 2013, the permittee noted completion of the requested operational controls. There are no outstanding compliance or enforcement issues at this treatment facility. Therefore, the permittee qualifies for a reduced monitoring data evaluation.

Monitoring Data Evaluation

Discharge Monitoring Report (DMR) data from May 2010 through April 2013 were reviewed and tabulated in the attached tables. Total suspended solids (TSS), pH, and biochemical oxygen demand (BOD₅) have been considered for reduced monitoring. Total residual chlorine limits are not considered eligible for reduced monitoring to ensure protection of aquatic life and human health. The actual performance to permit limit ratios are summarized in the table that follows. Facilities with baseline monitoring that have an actual performance to permit limit ratio of greater than 75 percent are not eligible for reduced monitoring.

Table 1 **Performance to Permit Limit Ratios (DMR Data)**

| Parameter | Actual Performance/ Permit Limit Monthly Average* | Actual Performance/ Permit Limit (Maximum)* | Reduced Monitoring |
|------------------|---|---|--------------------|
| TSS | 11%, 5.8% | 13%, 6.4% | 1/Week |
| BOD ₅ | 20%, 11% | 23%, 12% | 1/Week |
| pH | | | 1/Day |

*The ratio based upon concentration is listed first, and the ratio based upon loading is listed second.

pH: Several of the reported values were within 0.5 S.U. of the limit. So, the pH monitoring frequency has been continued at 1/day.

TSS and BOD₅: The DMR data are consistently well below the permit limits. According to Guidance Memo 98-2005, facilities with 3 days/week baseline monitoring that have an actual performance to permit limit ratio of less than 25 percent are eligible for a reduced monitoring frequency of 1/week. The monitoring frequency for BOD₅ and TSS has been reduced from 3 days/week to 1/week.

The permit will contain a special condition that will revert the TSS and BOD₅ monitoring frequencies back to 3 days/week if a Notice of Violation is issued for any of the parameters with reduced monitoring. The permittee is still expected to take all appropriate measures to control both the average and maximum concentrations of the pollutants of concern, regardless of any reductions in monitoring frequencies.

Table 2 Flow DMR Data for Pembroke WWTP

| Date DMR Due | MGD Monthly Ave. | MGD Max. |
|-------------------------|-----------------------------|-----------------|
| 10-Jun-10 | 0.099 | 0.144 |
| 10-Jul-10 | 0.084 | 0.125 |
| 10-Aug-10 | 0.089 | 0.112 |
| 10-Sep-10 | 0.096 | 0.135 |
| 10-Oct-10 | 0.11 | 0.16 |
| 10-Nov-10 | 0.12 | 0.147 |
| 10-Dec-10 | 0.096 | 0.204 |
| 10-Jan-11 | 0.116 | 0.221 |
| 10-Feb-11 | 0.119 | 0.138 |
| 10-Mar-11 | 0.123 | 0.165 |
| 10-Apr-11 | 0.117 | 0.291 |
| 10-May-11 | 0.107 | 0.154 |
| 10-Jun-11 | 111 | 0.185 |
| 10-Jul-11 | 0.087 | 0.122 |
| 10-Aug-11 | 0.085 | 0.116 |
| 10-Sep-11 | 0.087 | 0.098 |
| 10-Oct-11 | 0.092 | 0.135 |
| 10-Nov-11 | 0.096 | 0.106 |
| 10-Dec-11 | 0.091 | 0.121 |
| 10-Jan-12 | 0.098 | 0.171 |
| 10-Feb-12 | 0.092 | 0.11 |
| 10-Mar-12 | 0.095 | 0.141 |
| 10-Apr-12 | 0.088 | 0.121 |
| 10-May-12 | 0.09 | 0.118 |
| 10-Jun-12 | 0.093 | 0.12 |
| 10-Jul-12 | 0.087 | 0.107 |
| 10-Aug-12 | 0.087 | 0.132 |
| 10-Sep-12 | 0.089 | 0.107 |
| 10-Oct-12 | 0.093 | 0.169 |
| 10-Nov-12 | 0.086 | 0.101 |
| 10-Dec-12 | 0.084 | 0.1 |
| 10-Jan-13 | 0.088 | 0.104 |
| 10-Feb-13 | 0.092 | 0.214 |
| 10-Mar-13 | 0.092 | 0.114 |
| 10-Apr-13 | 0.087 | 0.100 |
| 10-May-13 | 0.089 | 0.124 |

Table 3 TSS and BOD₅ DMR Data for Pembroke WWTP

| Due Date | TSS | | | | BOD ₅ | | | |
|---------------------------------------|-----------------|-------------|-----------------|-------------|------------------|-------------|-----------------|-------------|
| | average kg/d | max kg/d | average mg/L | max mg/L | average kg/d | max kg/d | average mg/L | max mg/L |
| 10-Jun-10 | 1.4 | 1.9 | 4.1 | 6.3 | 2.7 | 5.2 | 6.3 | 11 |
| 10-Jul-10 | 1.7 | 2.7 | 5.3 | 8.3 | 1.5 | 1.9 | 4.7 | 6 |
| 10-Aug-10 | 0.9 | 1.1 | 2.9 | 3.7 | 0.9 | 1.3 | 2.8 | 3 |
| 10-Sep-10 | 3.8 | 9.5 | 8.7 | 19.2 | 3.9 | 8.5 | 9.6 | 18 |
| 10-Oct-10 | 3.1 | 6.4 | 8 | 14.7 | 5.4 | 6.9 | 12.9 | 16 |
| 10-Nov-10 | 1.1 | 1.6 | 2.6 | 3.7 | 3.4 | 6.6 | 7.6 | 15 |
| 10-Dec-10 | 2.1 | 2 | 4.6 | 4.7 | 4.3 | 5.5 | 9.6 | 13 |
| 10-Jan-11 | 1.7 | 2.1 | 4.2 | 6 | 2.9 | 4.1 | 6.8 | 9 |
| 10-Feb-11 | 1.8 | 2.7 | 4.2 | 6 | 5.2 | 9.8 | 11.6 | 22 |
| 10-Mar-11 | 1.4 | 2.8 | 3.2 | 6.3 | 2.5 | 3.2 | 5.3 | 7 |
| 10-Apr-11 | 1.9 | 2.8 | 4.9 | 8.3 | 4 | 9.5 | 10.6 | 27 |
| 10-May-11 | 1.8 | 3 | 4.7 | 8 | 4.7 | 10 | 12.3 | 27 |
| 10-Jun-11 | 1.1 | 1.5 | 2.5 | 4.3 | 4.2 | 6.1 | 10.4 | 14 |
| 10-Jul-11 | 0.7 | 0.8 | 2 | 2.7 | 1.9 | 2 | 5.8 | 6 |
| 10-Aug-11 | 0.5 | 0.6 | 1.5 | 2 | 0.9 | 1.3 | 2.7 | 4 |
| 10-Sep-11 | 0.6 | 0.7 | 1.9 | 2.3 | 1.3 | 1.3 | 4.1 | 4 |
| 10-Oct-11 | 0.8 | 1 | 2.3 | 3 | 1.6 | 2.6 | 4.5 | 7 |
| 10-Nov-11 | 0.6 | 0.7 | 1.5 | 2 | 0.1 | 0.6 | 0.4 | 2 |
| 10-Dec-11 | 0.5 | 0.7 | 1.5 | 2 | 0.5 | 0.5 | 1.4 | 4 |
| 10-Jan-12 | 0.8 | 1 | 2.2 | 3 | 3.3 | 4.2 | 6.3 | 9 |
| 10-Feb-12 | 0.8 | 1 | 2.4 | 3 | 1.9 | 2 | 2.6 | 5 |
| 10-Mar-12 | 0.7 | 1.2 | 2.1 | 3.3 | 2.3 | 4.1 | 6.8 | 13 |
| 10-Apr-12 | 0.7 | 0.8 | 2.1 | 2.3 | 1.3 | 2.4 | 4.2 | 7 |
| 10-May-12 | 0.5 | 0.6 | 1.5 | 1.7 | 1.4 | 3 | 4.1 | 8 |
| 10-Jun-12 | 0.8 | 1.4 | 2.2 | 4 | 1.3 | 2.1 | 3.8 | 6 |
| 10-Jul-12 | 0.6 | 0.7 | 1.7 | 2 | 0.6 | 0.9 | 1.5 | 3 |
| 10-Aug-12 | 0.7 | 1 | 2.3 | 3.3 | 0.4 | 1 | 0.9 | 2 |
| 10-Sep-12 | 0.5 | 0.9 | 1.5 | 2.7 | 0.4 | 1.1 | 1.2 | 3 |
| 10-Oct-12 | 0.6 | 0.8 | 1.7 | 2.3 | 0.2 | 0.7 | 0.5 | 2 |
| 10-Nov-12 | 1.2 | 1.5 | 3.6 | 4.3 | 0.3 | 1 | 1.3 | 3 |
| 10-Dec-12 | 1.2 | 1.8 | 3.7 | 5.3 | 2.2 | 3 | 6.8 | 9 |
| 10-Jan-13 | 1 | 2.6 | 2.9 | 7.7 | 1.6 | 3.6 | 4.8 | 11 |
| 10-Feb-13 | 4 | 11.7 | 10 | 24.7 | 4.3 | 15.1 | 9.4 | 27 |
| 10-Mar-13 | 1.1 | 1.9 | 3.1 | 5.3 | 3.9 | 7 | 11.2 | 20 |
| 10-Apr-13 | 1.7 | 3.6 | 5.2 | 10.7 | 2.7 | 5.6 | 8.2 | 16 |
| 10-May-13 | 1.2 | 1.3 | 3.5 | 4.0 | 2.9 | 3.0 | 8.6 | 9.0 |
| mean | 1.27 | 2.18 | 3.40 | 5.6 | 2.30 | 4.08 | 5.88 | 10.22 |
| maximum | 4.00 | 11.70 | 10.00 | 24.70 | 5.40 | 15.10 | 12.90 | 27.00 |
| minimum | 0.5 | 0.6 | 1.5 | 1.7 | 0.1 | 0.5 | 0.4 | 2 |
| permit limit | 22 | 34 | 30 | 45 | 22 | 34 | 30 | 45 |
| performance / permit limit) 100 | 5.8 | 6.4 | 11 | 13 | 10.5 | 12.0 | 20 | 23 |

Table 4 pH DMR Data for Pembroke WWTP

| Date DMR Due | pH, min S.U. | H ion conc | pH, max S.U. | H ion conc |
|--------------|--------------|------------|--------------|------------|
| 10-Jun-10 | 6.28 | 5.248E-07 | 7.83 | 1.479E-08 |
| 10-Jul-10 | 7.28 | 5.248E-08 | 7.72 | 1.905E-08 |
| 10-Aug-10 | 7.23 | 5.888E-08 | 7.73 | 1.862E-08 |
| 10-Sep-10 | 7.25 | 5.623E-08 | 7.87 | 1.349E-08 |
| 10-Oct-10 | 7.42 | 3.802E-08 | 7.84 | 1.445E-08 |
| 10-Nov-10 | 7.17 | 6.761E-08 | 7.95 | 1.122E-08 |
| 10-Dec-10 | 6.75 | 1.778E-07 | 7.53 | 2.951E-08 |
| 10-Jan-11 | 6.24 | 5.754E-07 | 7.35 | 4.467E-08 |
| 10-Feb-11 | 6.46 | 3.467E-07 | 7.11 | 7.762E-08 |
| 10-Mar-11 | 6.35 | 4.467E-07 | 7.29 | 5.129E-08 |
| 10-Apr-11 | 6.49 | 3.236E-07 | 7.13 | 7.413E-08 |
| 10-May-11 | 6.56 | 2.754E-07 | 7.48 | 3.311E-08 |
| 10-Jun-11 | 7.29 | 5.129E-08 | 7.8 | 1.585E-08 |
| 10-Jul-11 | 7.53 | 2.951E-08 | 8.18 | 6.607E-09 |
| 10-Aug-11 | 7.34 | 4.571E-08 | 7.98 | 1.047E-08 |
| 10-Sep-11 | 7.33 | 4.677E-08 | 7.9 | 1.259E-08 |
| 10-Oct-11 | 7.35 | 4.467E-08 | 7.77 | 1.698E-08 |
| 10-Nov-11 | 6.36 | 4.365E-07 | 7.74 | 1.820E-08 |
| 10-Dec-11 | 6.39 | 4.074E-07 | 7.39 | 4.074E-08 |
| 10-Jan-12 | 6.04 | 9.120E-07 | 7.1 | 7.943E-08 |
| 10-Feb-12 | 6.3 | 5.012E-07 | 7.53 | 2.951E-08 |
| 10-Mar-12 | 6.02 | 9.550E-07 | 6.73 | 1.862E-07 |
| 10-Apr-12 | 6.22 | 6.026E-07 | 6.82 | 1.514E-07 |
| 10-May-12 | 6.18 | 6.607E-07 | 7.08 | 8.318E-08 |
| 10-Jun-12 | 6.37 | 4.266E-07 | 7.07 | 8.511E-08 |
| 10-Jul-12 | 6.46 | 3.467E-07 | 7.36 | 4.365E-08 |
| 10-Aug-12 | 6.47 | 3.388E-07 | 7.19 | 6.457E-08 |
| 10-Sep-12 | 6.5 | 3.162E-07 | 7.2 | 6.310E-08 |
| 10-Oct-12 | 6.19 | 6.457E-07 | 7.23 | 5.888E-08 |
| 10-Nov-12 | 6.33 | 4.677E-07 | 7.02 | 9.550E-08 |
| 10-Dec-12 | 6.17 | 6.761E-07 | 6.63 | 2.344E-07 |
| 10-Jan-13 | 6.06 | 8.710E-07 | 6.79 | 1.622E-07 |
| 10-Feb-13 | 6.17 | 6.761E-07 | 7.72 | 1.905E-08 |
| 10-Mar-13 | 6.61 | 2.455E-07 | 7.56 | 2.754E-08 |
| 10-Apr-13 | 7.08 | 8.318E-08 | 7.58 | 2.630E-08 |
| 10-May-13 | 6.58 | 2.630E-07 | 7.76 | 1.738E-08 |

pH min. 6.02 S.U.
pH max 8.18 S.U.

Attachment I

Regional Water Quality Model (Version 4.0)

modout.txt

"Model Run For C:\Users\pmp94864\Documents\Working
files\BECKY\PERMITS\VPDES\Pembroke WWTP\Reissuance 2013\Data\Pembroke Model 2013.mod
On 7/3/2013 12:03:59 PM"

"Model is for NEW RIVER."
"Model starts at the PEMBROKE WWTP discharge."

"Background Data"
"7Q10", "CBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
485.846, 2, 0, 7.154, 24.2

"Discharge/Tributary Input Data for Segment 1"
"Flow", "CBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
.2, 30, 20, 0, 22.5

"Hydraulic Information for Segment 1"
"Length", "width", "Depth", "velocity"
"(mi)", "(ft)", "(ft)", "(ft/sec)"
.60606, 749.999, 2.1, .505

"Initial Mix Values for Segment 1"
"Flow", "DO", "CBOD", "nBOD", "DOSat", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
486.046, 7.151, 5.029, .03, 7.95, 24.1993

"Rate Constants for Segment 1. - (All units Per Day)"
"k1", "k1@T", "k2", "k2@T", "kn", "kn@T", "BD", "BD@T"
.5, .606, 3.96, 4.375, .25, .345, 0, 0

"Output for Segment 1"
"Segment starts at PEMBROKE WWTP"
"Total", "Segm."
"Dist.", "Dist.", "DO", "CBOD", "nBOD"
"(mi)", "(mi)", "(mg/l)", "(mg/l)", "(mg/l)"
0, 0, 7.151, 5.029, .03
.1, .1, 7.155, 5, .03
.2, .2, 7.155, 5, .03
.3, .3, 7.155, 5, .03
.4, .4, 7.155, 5, .03
.5, .5, 7.155, 5, .03
.606, .606, 7.155, 5, .03

"END OF FILE"

REGIONAL MODELING SYSTEM VERSION 4.0
Model Input File for the Discharge
to NEW RIVER.

File Information

File Name: C:\Users\pmp94864\Documents\Working files\BECKY\PERMITS\VPDES\P
Date Modified: July 03, 2013

Water Quality Standards Information

Stream Name: NEW RIVER
River Basin: New River Basin
Section: 1
Class: IV - Mountainous Zones Waters
Special Standards: u

Background Flow Information

Gauge Used: Eggleston Gauge
Gauge Drainage Area: 2961 Sq.Mi.
Gauge 7Q10 Flow: 474 MGD
Headwater Drainage Area: 3035 Sq.Mi.
Headwater 7Q10 Flow: 485.846 MGD (Net; includes Withdrawals/Discharges)
Withdrawal/Discharges: 0 MGD
Incremental Flow in Segments: 0.1600811 MGD/Sq.Mi.

Background Water Quality

Background Temperature: 24.2 Degrees C
Background cBOD5: 2 mg/l
Background TKN: 0 mg/l
Background D.O.: 7.154099 mg/l

Model Segmentation

Number of Segments: 1
Model Start Elevation: 1680 ft above MSL
Model End Elevation: 1676 ft above MSL

REGIONAL MODELING SYSTEM VERSION 4.0
Model Input File for the Discharge
to NEW RIVER.

Segment Information for Segment 1

Definition Information

| | |
|---------------------|---------------------|
| Segment Definition: | A discharge enters. |
| Discharge Name: | PEMBROKE WWTP |
| VPDES Permit No.: | VA0088048 |

Discharger Flow Information

| | |
|--------------|----------------|
| Flow: | 0.2 MGD |
| cBOD5: | 30 mg/l |
| TKN: | 20 mg/l |
| D.O.: | 0 mg/l |
| Temperature: | 22.5 Degrees C |

Geographic Information

| | |
|---------------------------|---------------|
| Segment Length: | 0.60606 miles |
| Upstream Drainage Area: | 3035 Sq.Mi. |
| Downstream Drainage Area: | 0 Sq.Mi. |
| Upstream Elevation: | 1680 Ft. |
| Downstream Elevation: | 1676 Ft. |

Hydraulic Information

| | |
|-------------------|---|
| Segment Width: | 749.999 Ft. |
| Segment Depth: | 2.1 Ft. |
| Segment Velocity: | 0.505 Ft./Sec. |
| Segment Flow: | 486.046 MGD |
| Incremental Flow: | -513.917 MGD (Applied at end of segment.) |

Channel Information

| | |
|------------------|-----------------------|
| Cross Section: | Rectangular |
| Character: | Moderately Meandering |
| Pool and Riffle: | No |
| Bottom Type: | Large Rock |
| Sludge: | None |
| Plants: | None |
| Algae: | None |

REGIONAL MODELING SYSTEM VERSION 4.0
**Model Input File for the Discharge
to NEW RIVER.**

Segment Information for Segment 1

Definition Information

| | |
|---------------------|---------------------|
| Segment Definition: | A discharge enters. |
| Discharge Name: | PEMBROKE WWTP |
| VPDES Permit No.: | VA0088048 |

Discharger Flow Information

| | |
|--------------|----------------|
| Flow: | 0.2 MGD |
| cBOD5: | 30 mg/l |
| TKN: | 20 mg/l |
| D.O.: | 0 mg/l |
| Temperature: | 22.5 Degrees C |

Geographic Information

| | |
|---------------------------|---------------|
| Segment Length: | 0.60606 miles |
| Upstream Drainage Area: | 3035 Sq.Mi. |
| Downstream Drainage Area: | 0 Sq.Mi. |
| Upstream Elevation: | 1680 Ft. |
| Downstream Elevation: | 1676 Ft. |

Hydraulic Information

| | |
|-------------------|---|
| Segment Width: | 749.999 Ft. |
| Segment Depth: | 2.1 Ft. |
| Segment Velocity: | 0.505 Ft./Sec. |
| Segment Flow: | 514.117 MGD |
| Incremental Flow: | -513.917 MGD (Applied at end of segment.) |

Channel Information

| | |
|------------------|-----------------------|
| Cross Section: | Rectangular |
| Character: | Moderately Meandering |
| Pool and Riffle: | No |
| Bottom Type: | Large Rock |
| Sludge: | None |
| Plants: | None |
| Algae: | None |

Attachment J

Public Notice

PUBLIC NOTICE – Environmental Permit

PURPOSE OF NOTICE: To seek public comment on a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater into a water body in Giles County, Virginia

PUBLIC COMMENT PERIOD: August 1, 2013 through August 30, 2013

PERMIT NAME: Virginia Pollutant Discharge Elimination System Permit – Wastewater issued by DEQ, under the authority of the State Water Control Board

APPLICANT NAME, ADDRESS, AND PERMIT NUMBER: Town of Pembroke, PO Box 5, Pembroke, VA 24136, VA0088048

FACILITY NAME AND LOCATION: Pembroke WWTP, 126 Park Lane, Pembroke, VA 24136

PROJECT DESCRIPTION: Pembroke WWTP has applied for a reissuance of a permit for the public wastewater treatment plant. The applicant proposes to release treated sewage wastewater at a rate of 200,000 gallons per day from the current facility into a water body. Sludge from the treatment process will be periodically transported to the New River Resource Authority for disposal. The facility proposes to release the treated sewage into the New River in the New River Watershed (VAW-N29R). A watershed is the land area drained by a river and its incoming streams. The permit will limit the following pollutants to amounts that protect water quality: organic matter, solids, toxic pollutants

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by e-mail, fax, or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for a public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requestor, including how and extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. A public hearing may be held, including another comment period, if a public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.

CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS, AND ADDITIONAL INFORMATION:

Becky L. France; ADDRESS: Virginia Department of Environmental Quality, Blue Ridge Regional Office, 3019 Peters Creek Road, Roanoke, VA 24019-2738; (540) 562-6700; E-MAIL ADDRESS: becky.france@deq.virginia.gov; FAX: (540) 562-6725. The public may review the draft permit and application at the DEQ office named above by appointment or may request copies of the documents from the contact person listed above.

Attachment K

EPA Checksheet

**State "FY2003 Transmittal Checklist" to Assist in Targeting
Municipal and Industrial Individual NPDES Draft Permits for Review**

Part I. State Draft Permit Submission Checklist

In accordance with the MOA established between the Commonwealth of Virginia and the United States Environmental Protection Agency, Region III, the Commonwealth submits the following draft National Pollutant Discharge Elimination System (NPDES) permit for Agency review and concurrence.

Facility Name: Pembroke WWTP

NPDES Permit Number: VA0088048

Permit Writer Name: Becky L. France

Date: 3/19/13

Major ☐Minor ☒Industrial ☐Municipal ☒

I.A. Draft Permit Package Submittal Includes:

| | Yes | No | N/A |
|---|----------|----|----------|
| 1. Permit Application? | X | | |
| 2. Complete Draft Permit (for renewal or first time permit – entire permit, including boilerplate information)? | X | | |
| 3. Copy of Public Notice? | X | | |
| 4. Complete Fact Sheet? | X | | |
| 5. A Priority Pollutant Screening to determine parameters of concern? | X | | |
| 6. A Reasonable Potential analysis showing calculated WQBELs? | X | | |
| 7. Dissolved Oxygen calculations? | X | | |
| 8. Whole Effluent Toxicity Test summary and analysis? | | | X |
| 9. Permit Rating Sheet for new or modified industrial facilities? | | | X |

I.B. Permit/Facility Characteristics

| | Yes | No | N/A |
|---|----------|----------|-----|
| 1. Is this a new, or currently unpermitted facility? | | X | |
| 2. Are all permissible outfalls (including combined sewer overflow points, non-process water and storm water) from the facility properly identified and authorized in the permit? | X | | |
| 3. Does the fact sheet or permit contain a description of the wastewater treatment process? | X | | |

| I.B. Permit/Facility Characteristics – cont. (FY2003) | | Yes | No | N/A |
|---|---|-----|----|-----|
| 4. | Does the review of PCS/DMR data for at least the last 3 years indicate significant non-compliance with the existing permit? under consent order | X | | |
| 5. | Has there been any change in streamflow characteristics since the last permit was developed? | X | | |
| 6. | Does the permit allow the discharge of new or increased loadings of any pollutants? | | X | |
| 7. | Does the fact sheet or permit provide a description of the receiving water body(s) to which the facility discharges, including information on low/critical flow conditions and designated/existing uses? | X | | |
| 8. | Does the facility discharge to a 303(d) listed water? | X | | |
| | a. Has a TMDL been developed and approved by EPA for the impaired water? | | X | |
| | b. Does the record indicate that the TMDL development is on the State priority list and will most likely be developed within the life of the permit? | X | | |
| | c. Does the facility discharge a pollutant of concern identified in the TMDL or 303(d) listed water? | | X | |
| 9. | Have any limits been removed, or are any limits less stringent, than those in the current permit | | X | |
| 10. | Does the permit authorize discharges of storm water? | | | X |
| 11. | Has the facility substantially enlarged or altered its operation or substantially increased its flow or production? | | X | |
| 12. | Are there any production-based, technology-based effluent limits in the permit? | | X | |
| 13. | Do any water quality-based effluent limit calculations differ from the State's standard policies or procedures? | | X | |
| 14. | Are any WQBELs based on an interpretation of narrative criteria? | | X | |
| 15. | Does the permit incorporate any variances or other exceptions to the State's standards or regulations? | | X | |
| 16. | Does the permit contain a compliance schedule for any limit or condition? | | X | |
| 17. | Is there a potential impact to endangered/threatened species or their habitat by the facility's discharge(s)? | | X | |
| 18. | Have impacts from the discharge(s) at downstream potable water supplies been evaluated? | | | X |
| 19. | Is there any indication that there is significant public interest in the permit action proposed for this facility? | | X | |
| 20. | Have previous permit, application, and fact sheet been examined? | X | | |

Part II. NPDES Draft Permit Checklist (FY2003)

Region III NPDES Permit Quality Checklist – for POTWs (To be completed and included in the record only for POTWs)

| II.A. Permit Cover Page/Administration | Yes | No | N/A |
|---|-----|----|-----|
| 1. Does the fact sheet or permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)? | X | | |
| 2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)? | X | | |

| II.B. Effluent Limits – General Elements | Yes | No | N/A |
|--|-----|----|-----|
| 1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)? | X | | |
| 2. Does the fact sheet discuss whether “antibacksliding” provisions were met for any limits that are less stringent than those in the previous NPDES permit? | | | X |

| II.C. Technology-Based Effluent Limits (POTWs) | Yes | No | N/A |
|--|-----|----|-----|
| 1. Does the permit contain numeric limits for <u>ALL</u> of the following: BOD (or alternative, e.g., CBOD, COD, TOC), TSS, and pH? | X | | |
| 2. Does the permit require at least 85% removal for BOD (or BOD alternative) and TSS (or 65% for equivalent to secondary) consistent with 40 CFR Part 133? | X | | |
| a. If no, does the record indicate that application of WQBELs, or some other means, results in more stringent requirements than 85% removal or that an exception consistent with 40 CFR 133.103 has been approved? | | | X |
| 3. Are technology-based permit limits expressed in the appropriate units of measure (e.g., concentration, mass, SU)? | X | | |
| 4. Are permit limits for BOD and TSS expressed in terms of both long term (e.g., average monthly) and short term (e.g., average weekly) limits? | X | | |
| 5. Are any concentration limitations in the permit less stringent than the secondary treatment requirements (30 mg/l BOD5 and TSS for a 30-day average and 45 mg/l BOD5 and TSS for a 7-day average)? | | X | |
| a. If yes, does the record provide a justification (e.g., waste stabilization pond, trickling filter, etc.) for the alternate limitations? | | | X |

| II.D. Water Quality-Based Effluent Limits | Yes | No | N/A |
|--|-----|----|-----|
| 1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality? | X | | |
| 2. Does the fact sheet indicate that any WQBELs were derived from a completed and EPA approved TMDL? | | | X |

| II.D. Water Quality-Based Effluent Limits – cont. (FY2003) | Yes | No | N/A |
|---|------------|-----------|------------|
| 3. Does the fact sheet provide effluent characteristics for each outfall? | X | | |
| 4. Does the fact sheet document that a “reasonable potential” evaluation was performed? | X | | |
| a. If yes, does the fact sheet indicate that the “reasonable potential” evaluation was performed in accordance with the State’s approved procedures? | X | | |
| b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone? | X | | |
| c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have “reasonable potential”? | X | | |
| d. Does the fact sheet indicate that the “reasonable potential” and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations)? | | | X |
| e. Does the permit contain numeric effluent limits for all pollutants for which “reasonable potential” was determined? | X | | |
| 5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet? | X | | |
| 6. For all final WQBELs, are BOTH long-term AND short-term effluent limits established? | X | | |
| 7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)? | X | | |
| 8. Does the record indicate that an “antidegradation” review was performed in accordance with the State’s approved antidegradation policy? | X | | |

| II.E. Monitoring and Reporting Requirements | Yes | No | N/A |
|--|------------|-----------|------------|
| 1. Does the permit require at least annual monitoring for all limited parameters and other monitoring as required by State and Federal regulations? | X | | |
| a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver? | | | X |
| 2. Does the permit identify the physical location where monitoring is to be performed for each outfall? | X | | |
| 3. Does the permit require at least annual influent monitoring for BOD (or BOD alternative) and TSS to assess compliance with applicable percent removal requirements? | | X | |
| 4. Does the permit require testing for Whole Effluent Toxicity? | | X | |

| II.F. Special Conditions | Yes | No | N/A |
|---|------------|-----------|------------|
| 1. Does the permit include appropriate biosolids use/disposal requirements? | X | | |
| 2. Does the permit include appropriate storm water program requirements? | | | X |

| II.F. Special Conditions – cont. (FY2003) | Yes | No | N/A |
|---|------------|-----------|------------|
| 3. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements? | | | X |
| 4. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations? | X | | |
| 5. Does the permit allow/authorize discharge of sanitary sewage from points other than the POTW outfall(s) or CSO outfalls [i.e., Sanitary Sewer Overflows (SSOs) or treatment plant bypasses]? | | X | |
| 6. Does the permit authorize discharges from Combined Sewer Overflows (CSOs)? | | | X |
| a. Does the permit require implementation of the "Nine Minimum Controls"? | | | X |
| b. Does the permit require development and implementation of a "Long Term Control Plan"? | | | X |
| c. Does the permit require monitoring and reporting for CSO events? | | | X |
| 7. Does the permit include appropriate/ Pretreatment Program requirements? | | | X |

| II.G. Standard Conditions | Yes | No | N/A |
|---|-----------------------------|---------------------------|-----|
| 1. Does the permit contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions? | X | | |
| List of Standard Conditions – 40 CFR 122.41 | | | |
| Duty to comply | Property rights | Reporting Requirements | |
| Duty to reapply | Duty to provide information | Planned change | |
| Need to halt or reduce activity not a defense | Inspections and entry | Anticipated noncompliance | |
| Duty to mitigate | Monitoring and records | Transfers | |
| Proper O & M | Signatory requirement | Monitoring reports | |
| Permit actions | Bypass | Compliance schedules | |
| | Upset | 24-Hour reporting | |
| | | Other non-compliance | |
| 2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for POTWs regarding notification of new introduction of pollutants and new industrial users [40 CFR 122.42(b)]? | X | | |

Part II. NPDES Draft Permit Checklist (FY2003),
Region III NPDES Permit Quality Review Checklist – For Non-Municipals
(To be completed and included in the record for all non-POTWs)

-----NOT APPLICABLE-----

Part III. Signature Page (FY2003)

Based on a review of the data and other information submitted by the permit applicant, and the draft permit and other administrative records generated by the Department/Division and/or made available to the Department/Division, the information provided on this checklist is accurate and complete, to the best of my knowledge.

| | |
|-----------|-------------------------------|
| Name | <u>Becky L. France</u> |
| Title | <u>Water Permit Writer</u> |
| Signature | <u><i>Becky L. France</i></u> |
| Date | <u>3/19/13</u> |